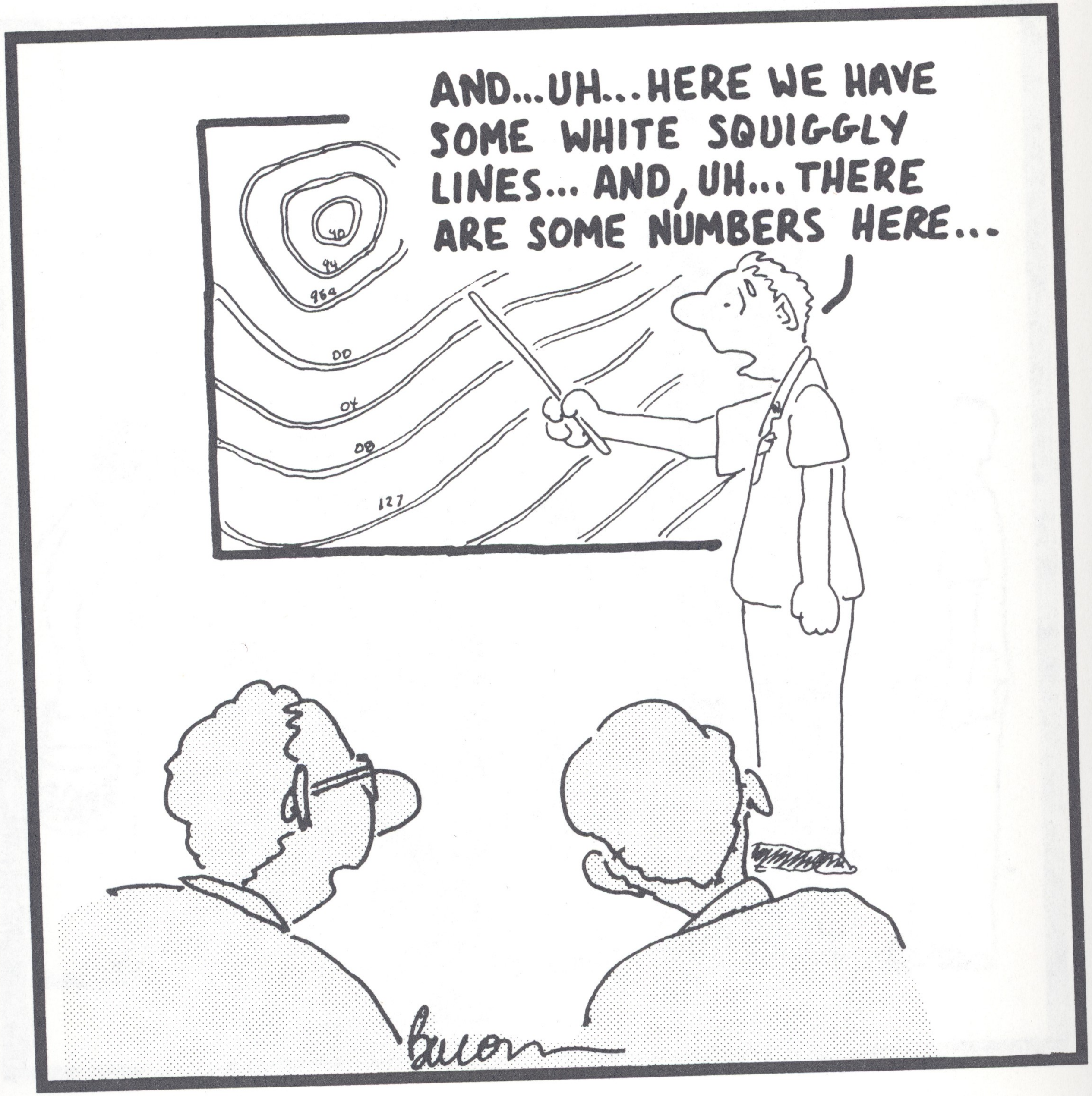
Weather for the Mariner



"Uh oh. . . looks like we have another one of those lateral-transfer meteorologists."

OBJECTIVES

- Air Masses
- Fronts
- Wind/Waves
- Sea State
- Clouds
- Wx Charts

Air Masses & Fronts

- Air masses
  - Source regions
  - Classification
  - Introduce Stability
  - Air masses of North America
- Fronts

cP, mP, cT, mT, cA, mE

cP = Continental Polar – dry, cold air

mP = Maritime Polar – moist, cold air

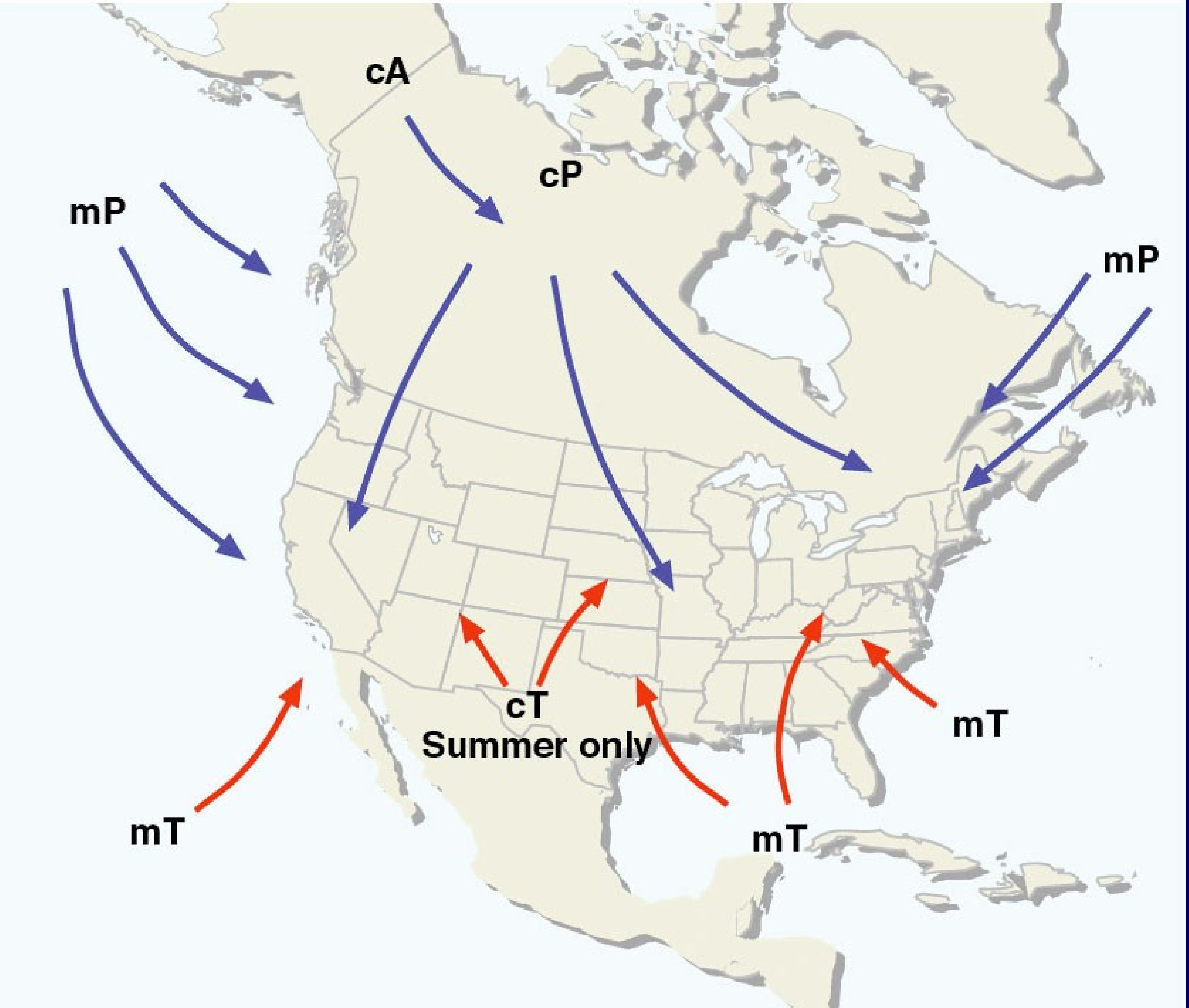
cT = Continental Tropical – dry, warm air

mT = Maritime Tropical – moist, warm air

cA = Continental *Arctic* = *dry, extremely cold cP air*

4 Classifications: *Humidity & Temperature*

- c = Continental
  - over land (dry)
- m = Maritime
  - over water (moist)
- P = Polar
  - Polar latitudes (cold)
- T = Tropical
  - Tropical regions (warm)


cA
cP
mP
mP
cT
Summer only
mT
mT
mT

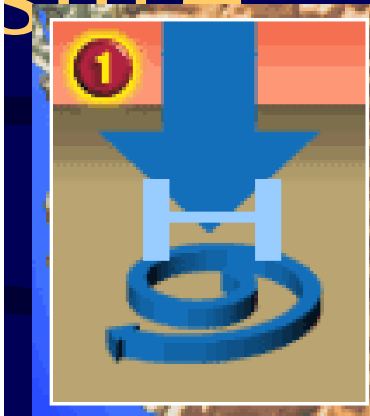
High and Low Pressure Systems

Low Pressure

Cyclonic Turning:

Surface Convergence leads to <u>upward</u> vertical

High Pressure



Anti-Cyclonic Turning:

Surface Divergence leads to <u>downward</u> vertical motions.

Source: USA TODAY research by Chad Palmer, Graphic by Kevin A. Kepple

Intro to Stability

A

warm
cold

B

cold
warm

- STABLE – why?
  - Warm air is less dense
  - Cold air is more dense
  - Little mixing
  - ∴ Stable environment
- UNSTABLE – why?
  - Since warm air is less dense and cold air is more dense—the warm air wants to rise and the cold air wants to sink
  - Lots of vertical mixing
  - ∴ Unstable environment

Movement of air masses

- Air masses move in response to winds aloft…

  Becomes modified by surfaces of different temperatures and moisture content

- How can you determine the *stability* of the air mass?
  - By looking at *how the air mass is be* *d* *ce*:

Movement of air masses

The hot surface is warming the lower
of the polar air mass. This leads t
kind of stability?
The cold surface is cooling the lower
of the polar air mass even more. S

Movement of air masses

How about for a *tropical* air mass?

How would stability be affected for the two situations?

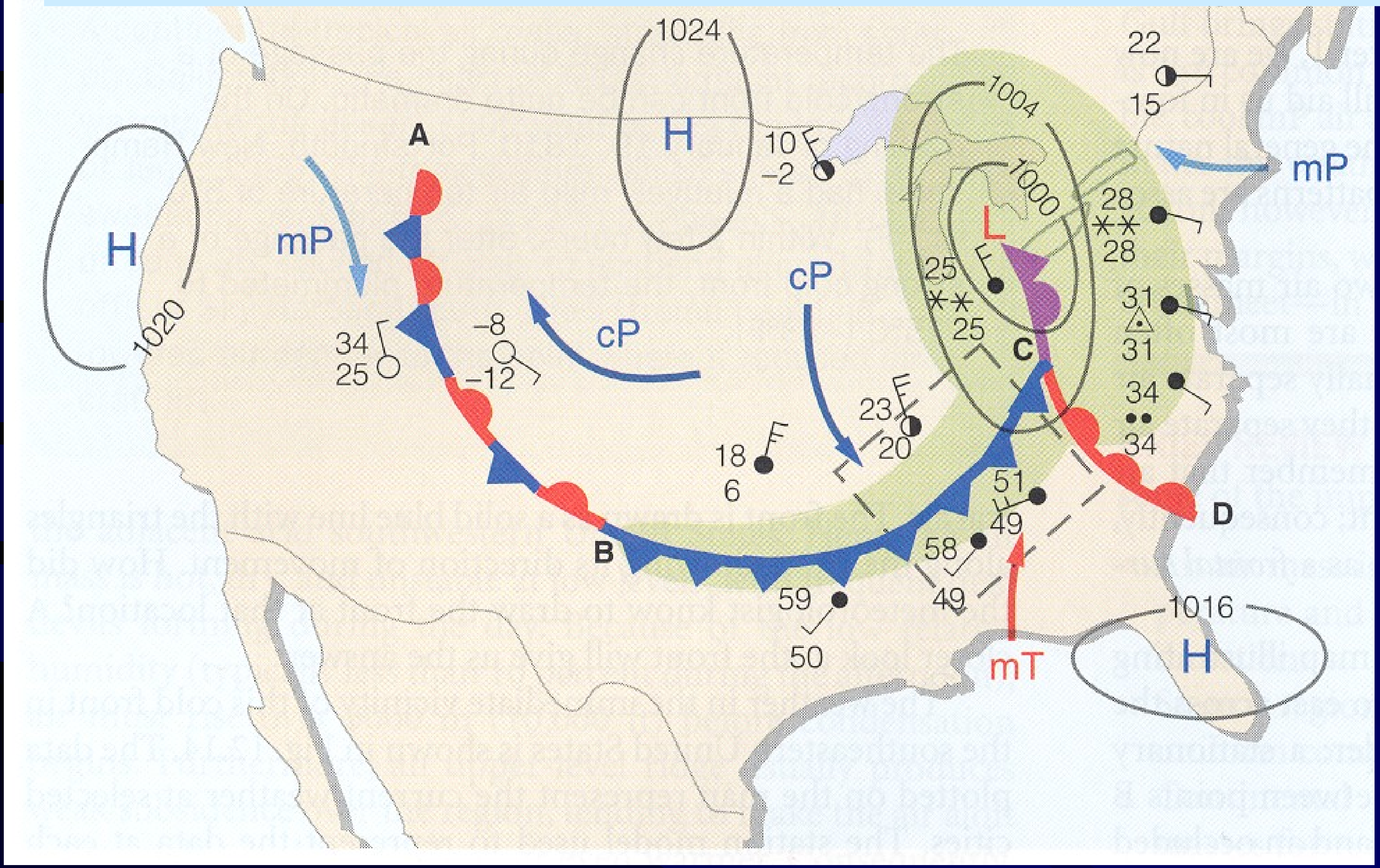
Movement of air masses

How about for a *tropical* air mass?

- How would stability be affected for the two situations?
- The hotter the surface air becomes, the more buoyant it is = unstable = more mixing

FRONTS

How is each front depicted on a weather cha



C-D

A-B

B-C

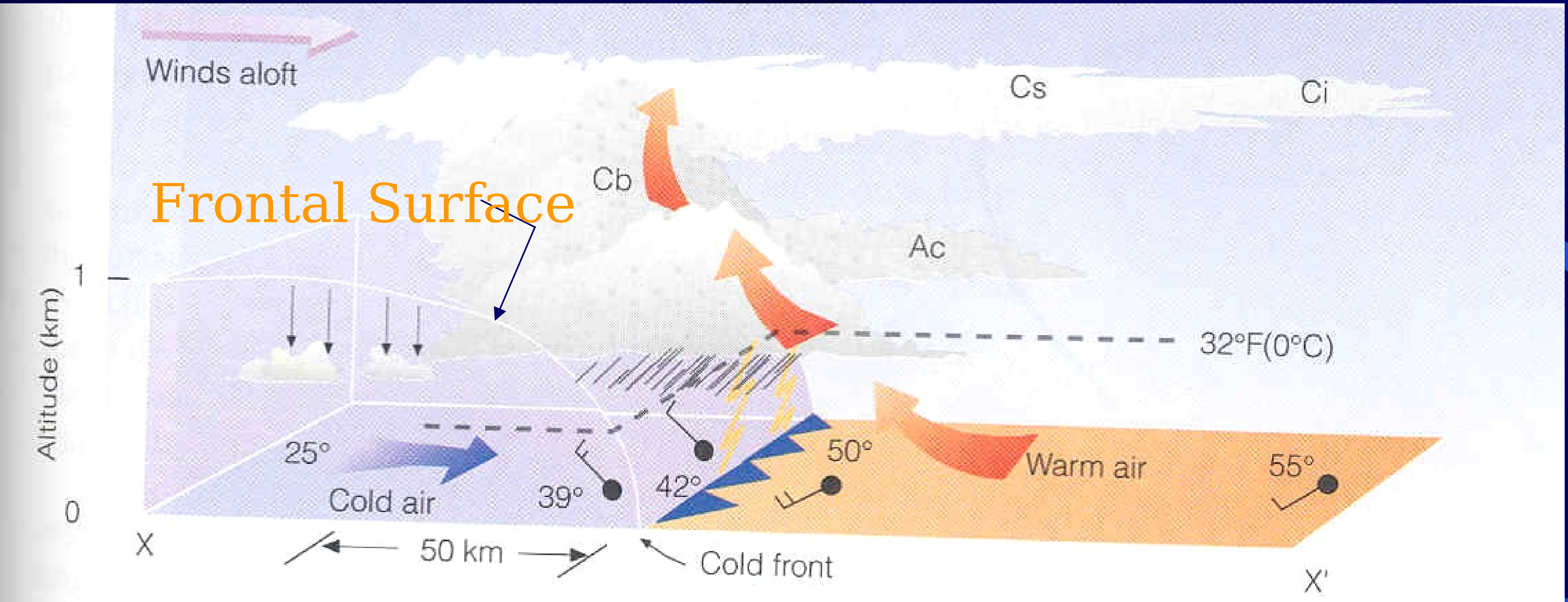
Low pressure-C

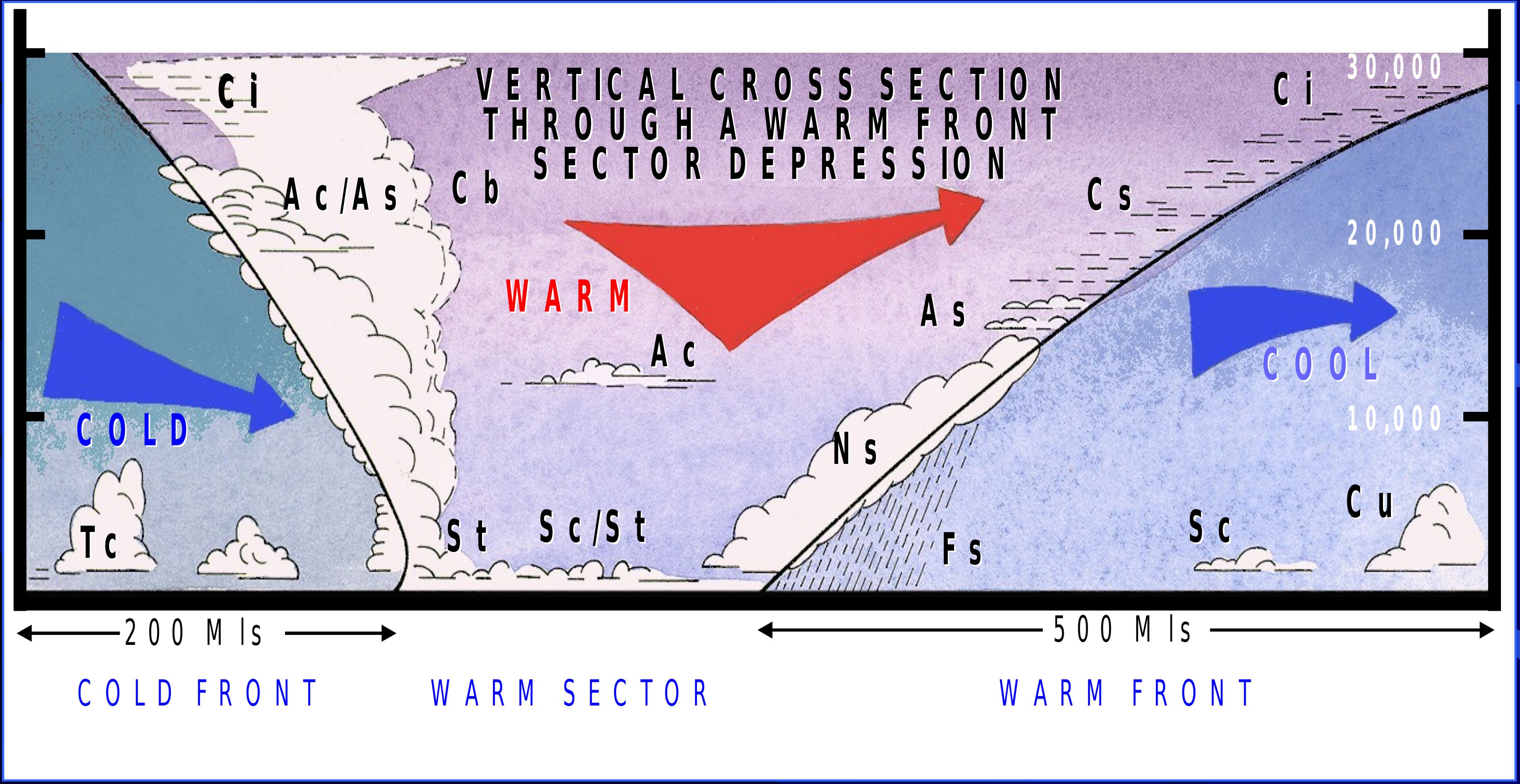
What are the 5 ways of locating a front on a surface weather map?

1. Sharp temperature changes over a relatively short distance
2. Changes in the air's moisture content (changes in dew point)
3. Shifts in wind direction
4. Clouds and precipitation patterns
5. Pressure and pressure changes

What do fronts depict?

- The transition zone between 2 air masses of different densities
- Density differences → Temperature differences → Humidity differences



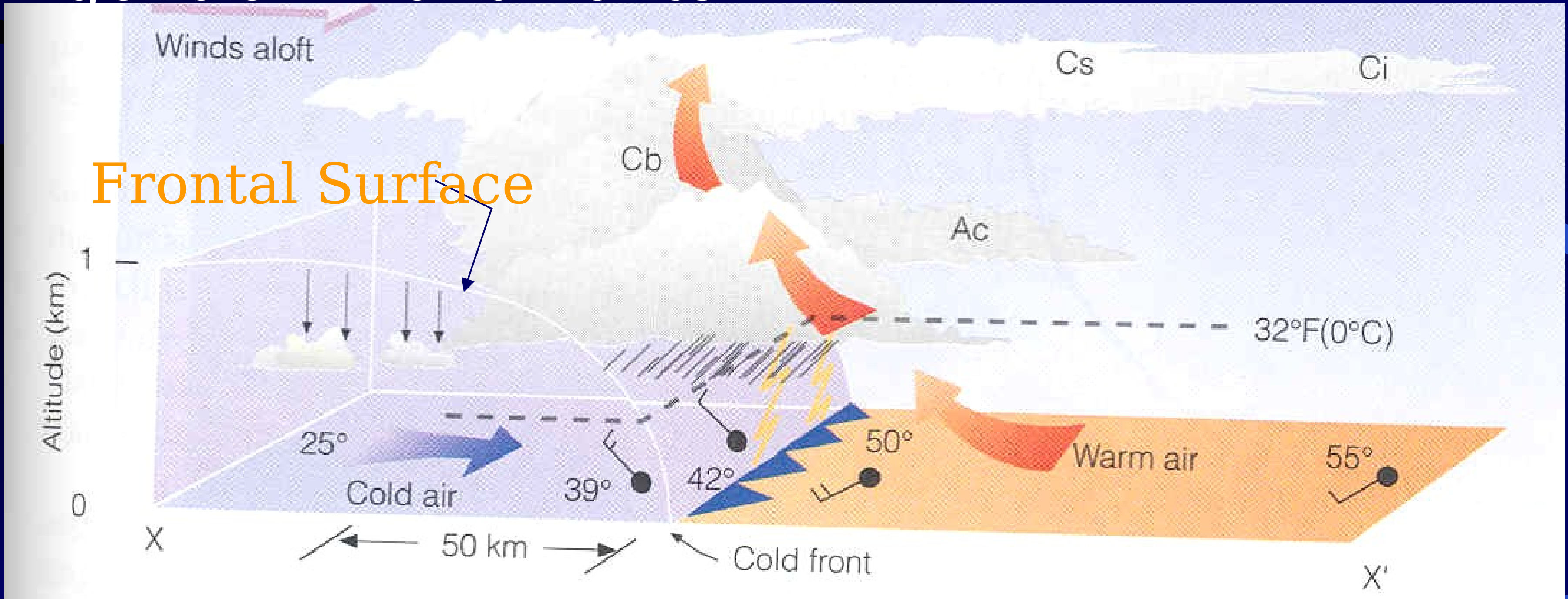

VERTICAL CROSS SECTION
THROUGH A WARM FRONT
SECTOR DEPRESSION
Ci
Ac/As
Cb
Cs
Ci
30,000
20,000
10,000
WARM
Ac
As
COOL
COLD
Ns
Tc
St
Sc/St
Fs
Sc
Cu
200 Mls
500 Mls
COLD FRONT
WARM SECTOR
WARM FRONT

- Cold front is the leading edge of a cold air mass (cP or mP)
- As the cold front plows into warmer, lighter air, it produces towering clouds, precipitation and sometimes, thunderstorms.

Source: USA TODAY research by Chad Palmer, Graphic by John F

Cold front's leading edge

- Steep – due to surface friction
- Fast-moving front - Slope is 1:50 (vertical rise to horizontal distance in km) = "katafronts"
- Slow-moving front – Slope is much more gentle = "anafronts"



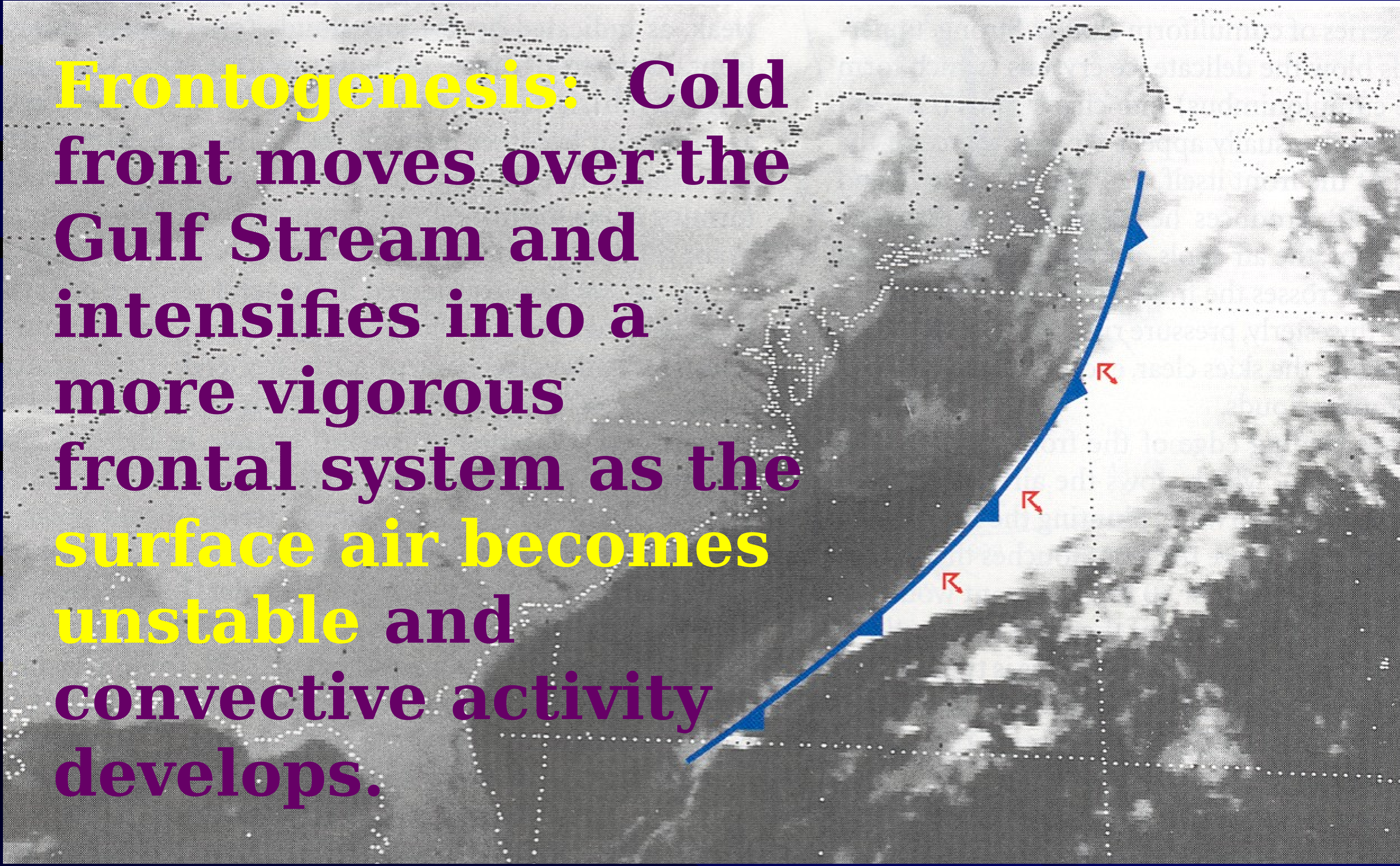
COLD FRONTS: Slow vs Fast moving fronts

- Which of the above fronts has a broad cloud cover behind the front? Why?
  - Slow-moving fronts: The more g
  slope allows clouds to form behind
  front.
  - This makes it difficult to depict th
  surface front from the satellite im

Fast Moving Cold Fronts

- Fast-moving fronts:
  - have a line of active showers and thunderstorms
  - “squall line” - develops parallel to and <u>often ahead</u> of the advancing front—producing heavy precipitation & strong gusty winds.

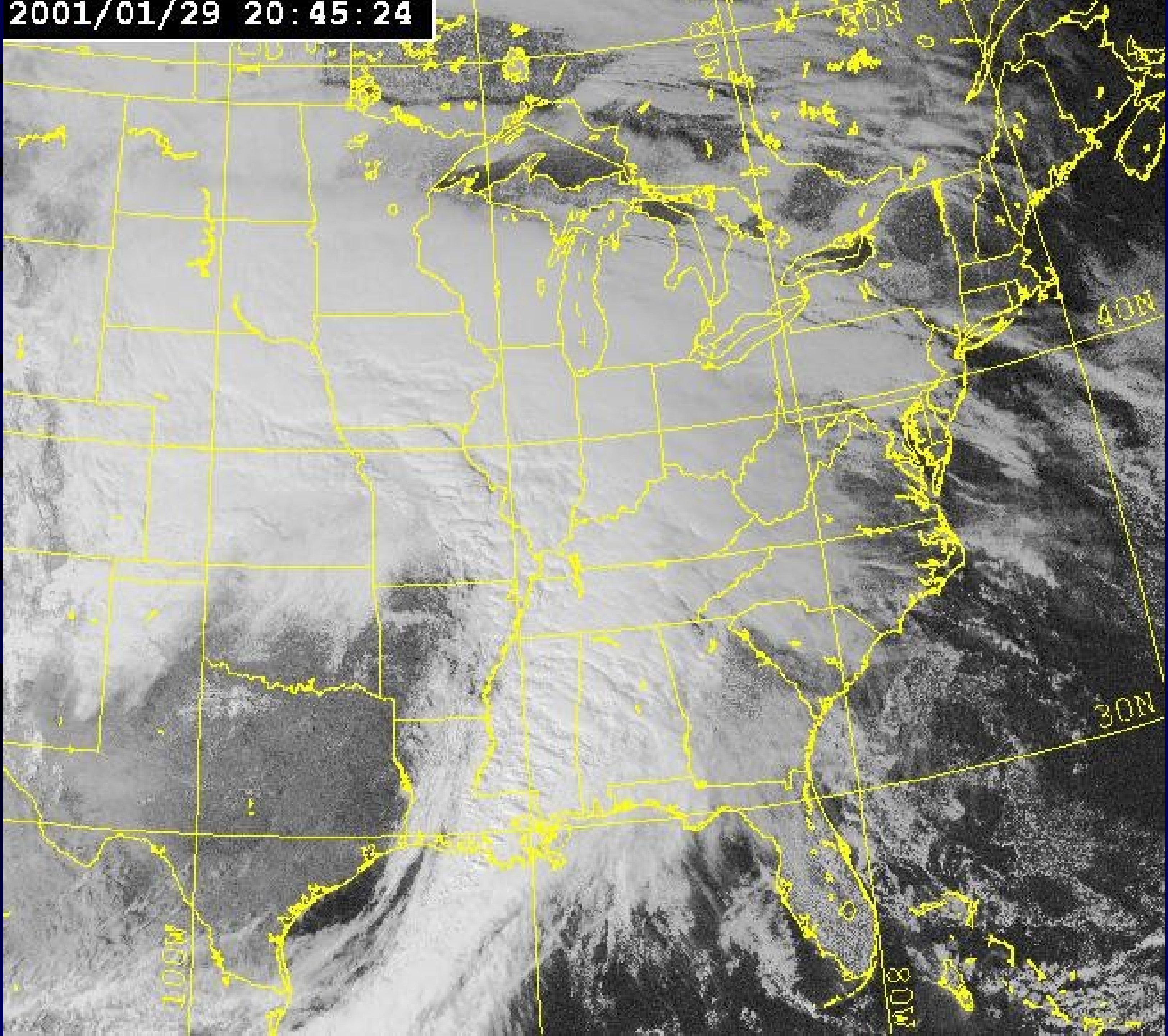
The *steep slope* of the front pushes the weather <u>ahead of the front</u>.

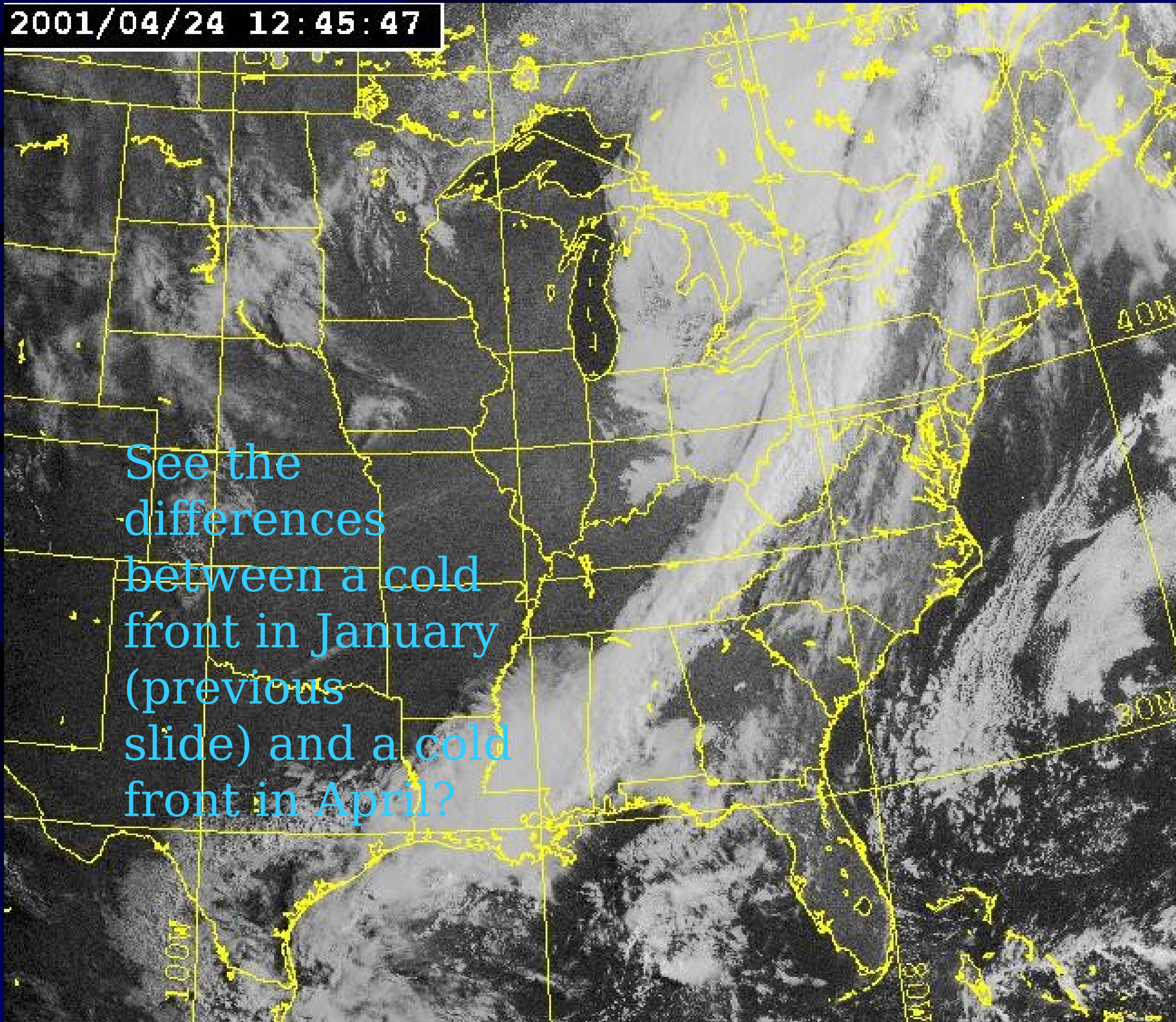


Frontogenesis: **Cold front moves over the Gulf Stream and intensifies into a more vigorous frontal system as the surface air becomes unstable and convective activity develops.**

When a cold front passes?

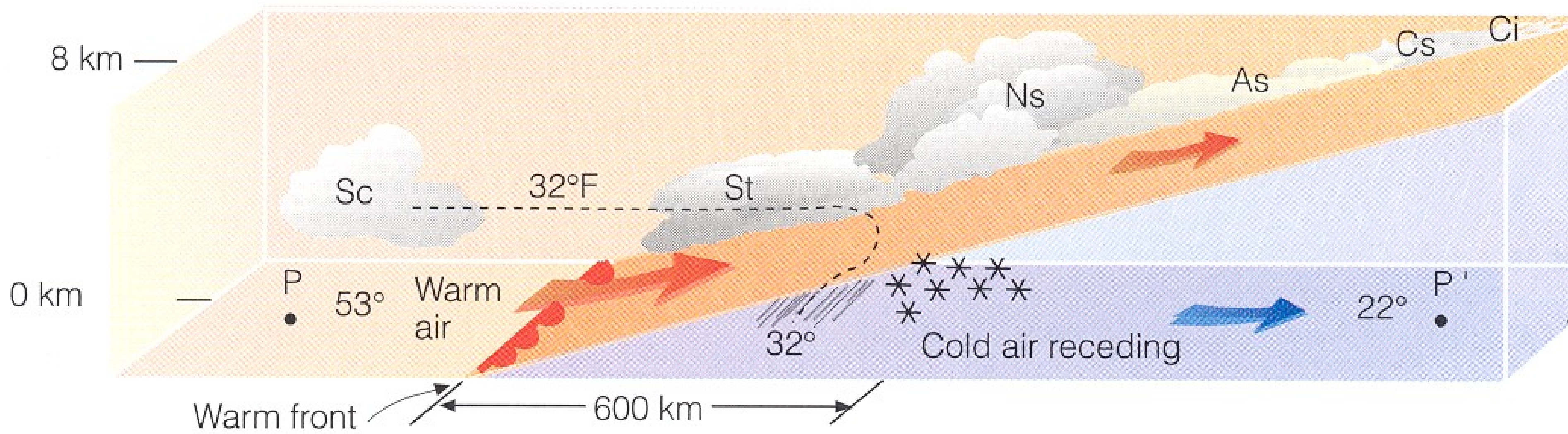
Wind:	Veers
Pressure:	Rises
Temperature:	Falls
Dew Point:	Falls more
Cloud Base:	Rises
Weather:	Rain then showers
Visibility:	Improves


2001/01/29 20:45:24
40N
30N
100W
80W



See the differences between a cold front in January (previous slide) and a cold front in April?

WARM FRONT

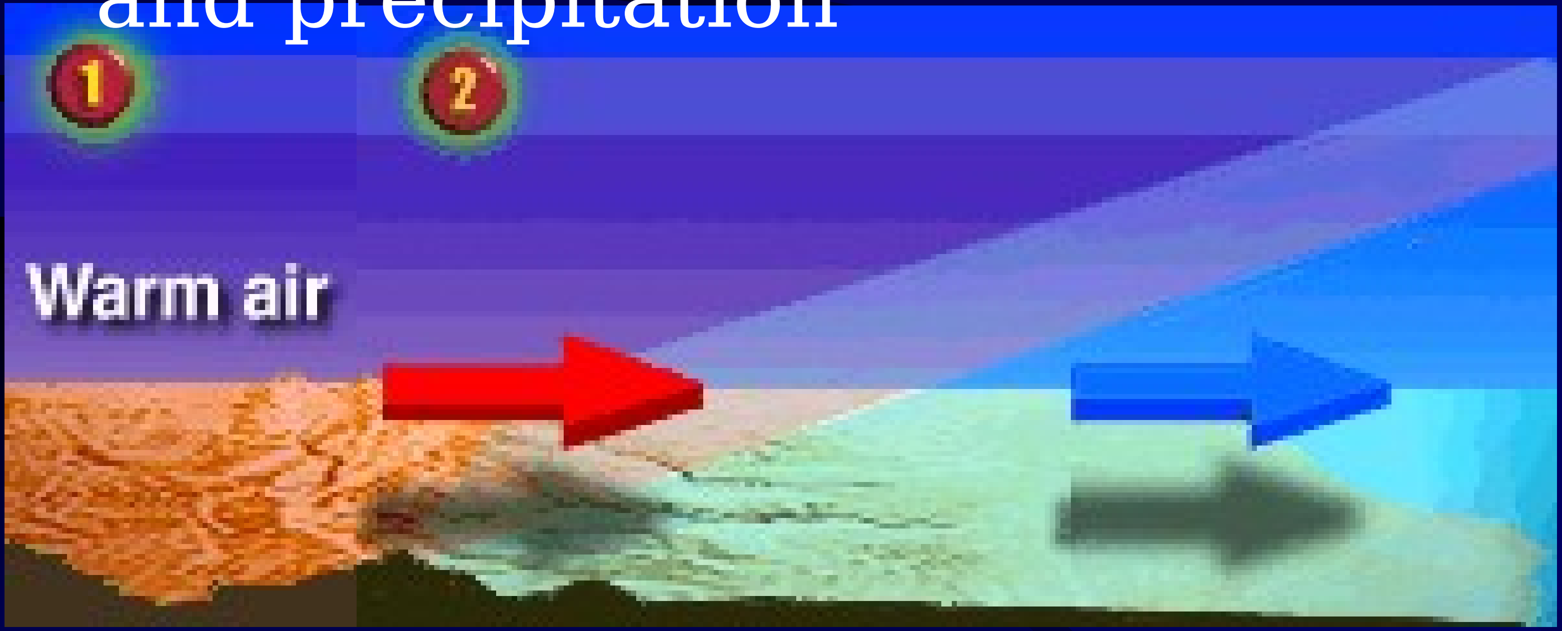


(a)

Notice the slope is much more gentle… 1:150 to 1:200. The cloud cover is usually (<u>ahead/behind</u>) of the warm front.

Warm front is the leading edge of warm air (mT or cT)

Heavier, denser cold air retreats slowly as warm air rides up and over the cold air, producing widespread clouds and precipitation



Source: USA TODAY research by Chad Palmer, Graphic by John F

When a warm front passes?

Wind: Veers

Pressure: Falls then steadies

Temperature: Rises

Dew Point: Rises

Cloud Base: Falls

Weather: Rain to drizzle

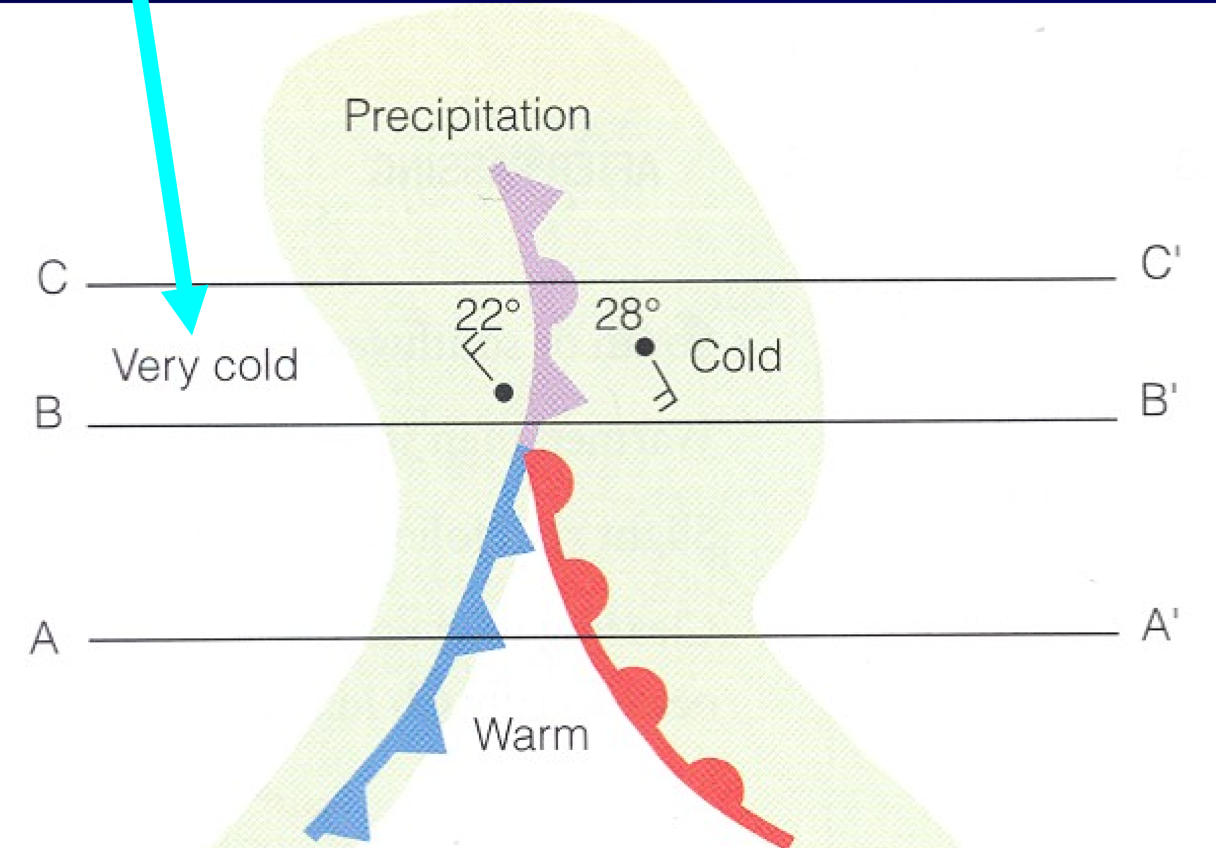
Visibility: Deteriorates

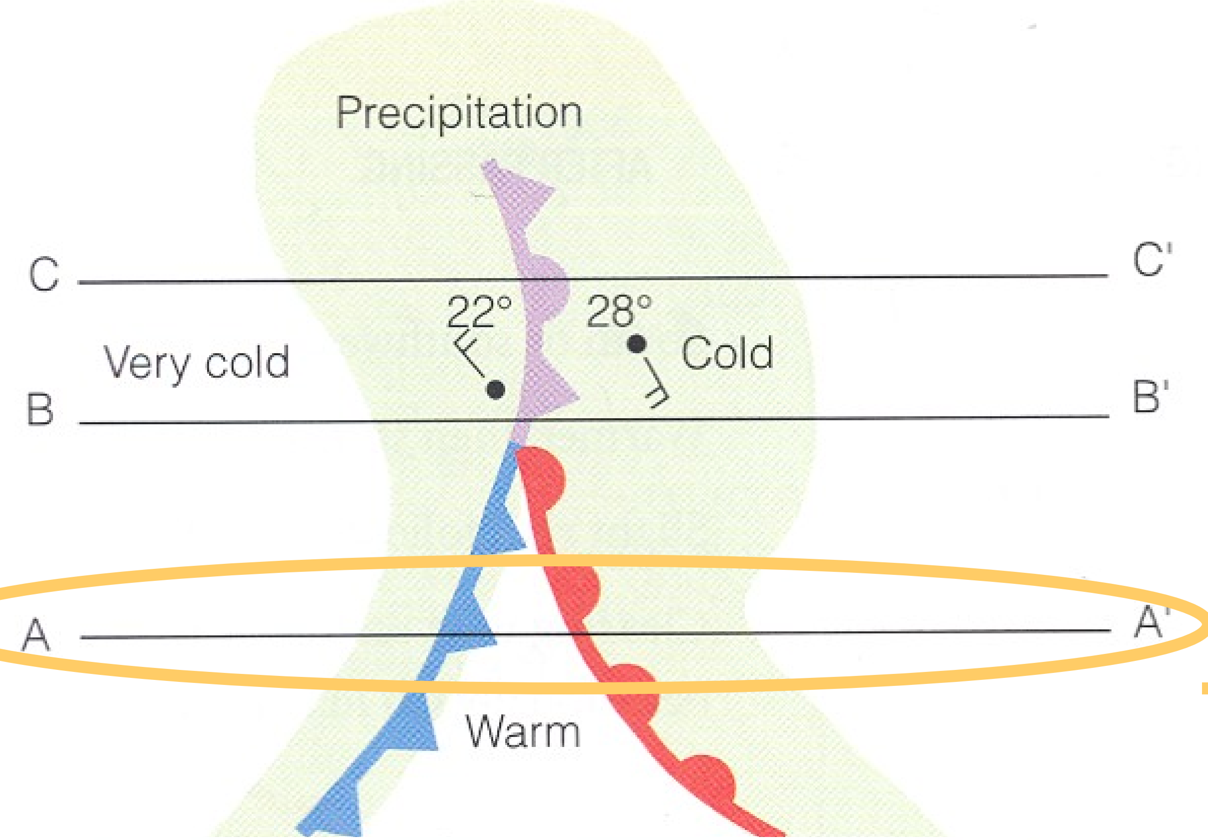
Occluded Front

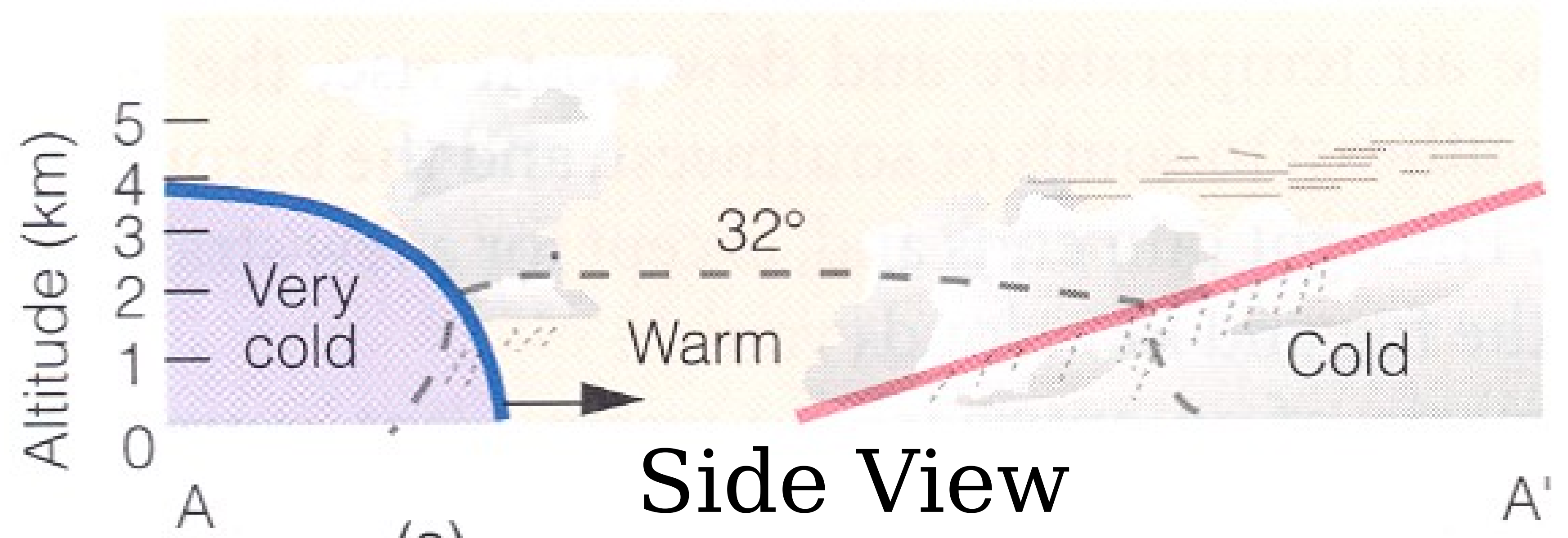
- When frontal systems are born, there are 2 fronts: a cold front and warm front.
- Cold fronts are usually *faster* than warm fronts.
- Eventually the cold front will catch up to the warm front
- The combination of the two fronts produces an **occluded front**, where some of the most severe weather conditions exist, especially near the **triple point**, where all three fronts meet (cold, warm & occluded).
- Indicates the later stages of a storm’s life cycle

Occluded Fronts: Cold vs Warm Type

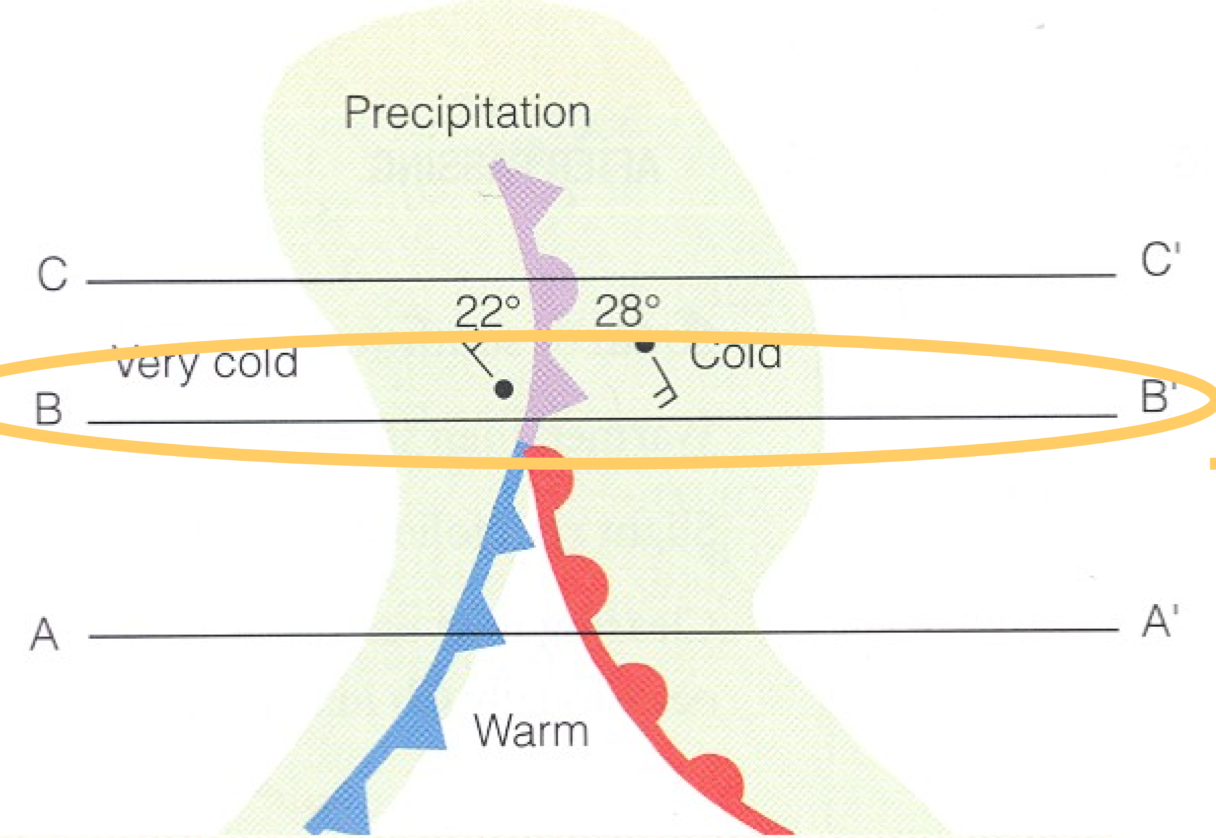
- Cold Occlusion: When the air behind the occlusion is colder than the air ahead of it.

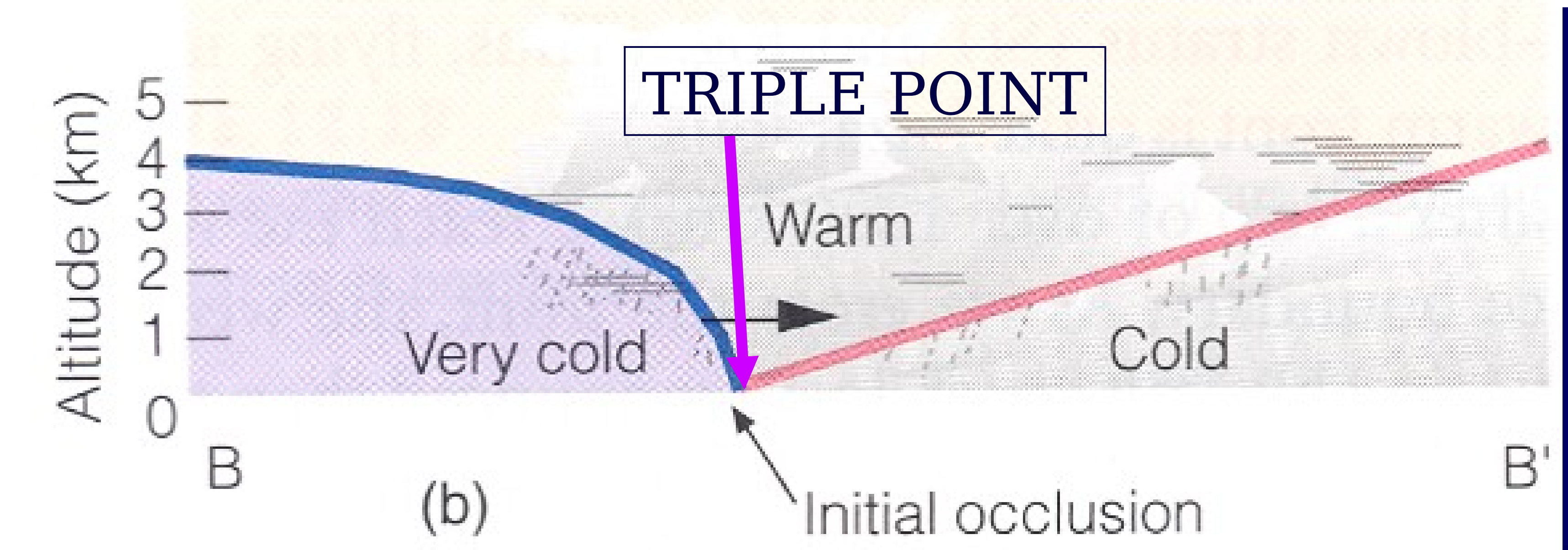


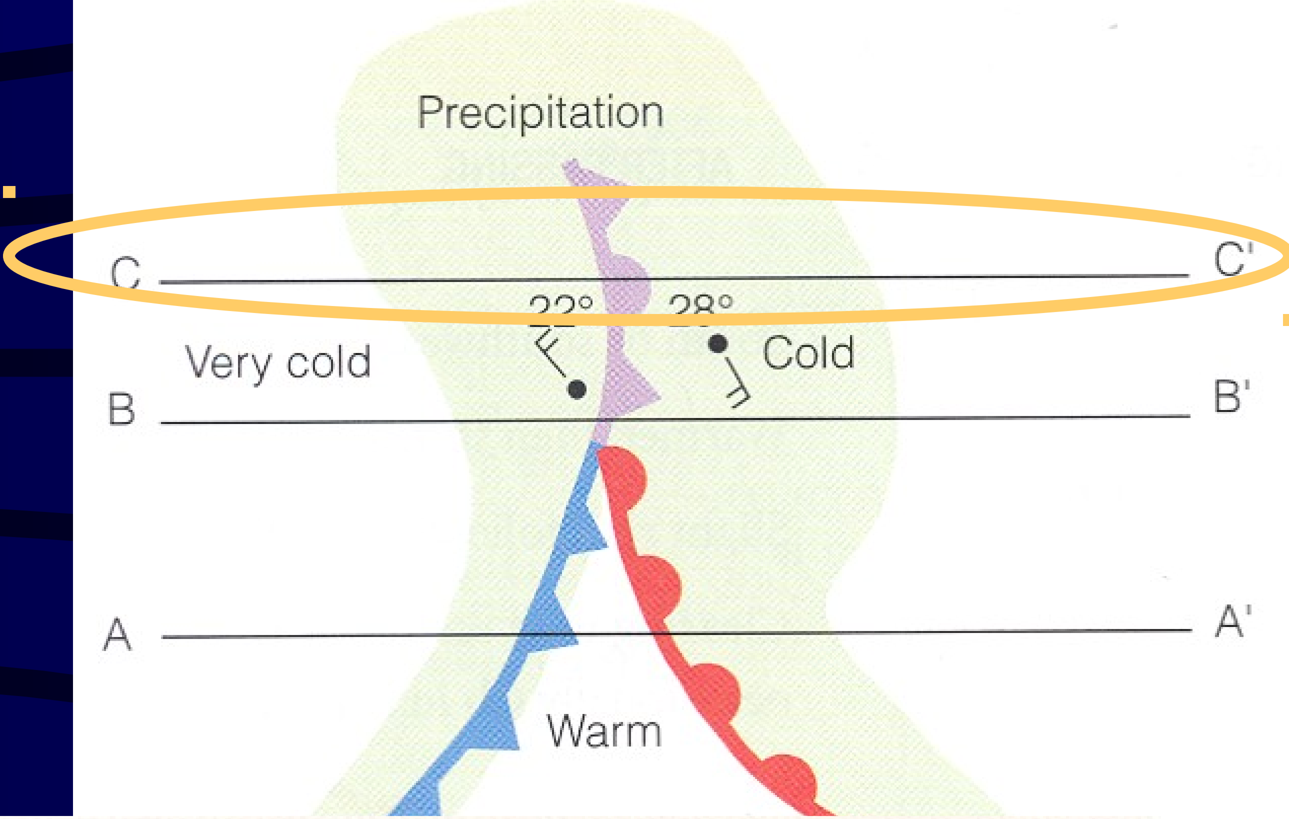

Precipitation
C
C'
22°
28°
Very cold
Cold
B
B'
A
A'
Warm

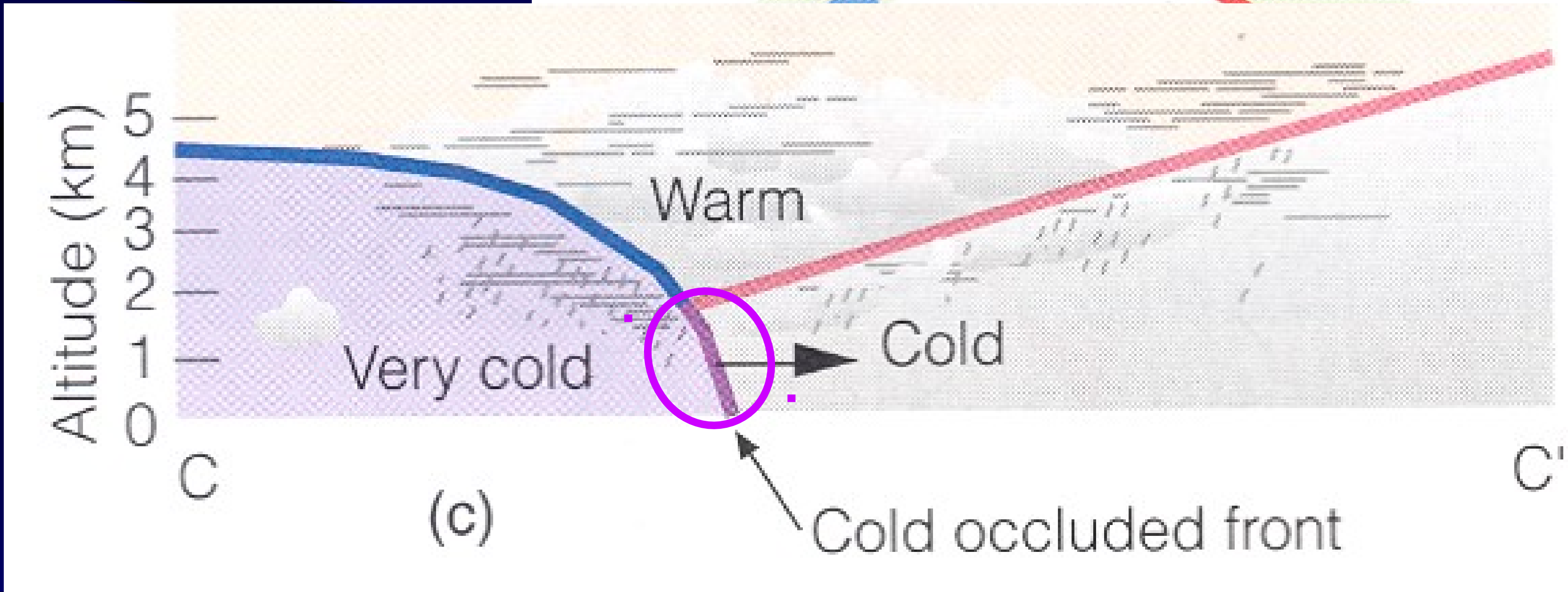

Altitude (km)
5
4
3
2
1
0
32°
Very cold
Warm
Cold
A
A'

Side View


Precipitation
C
C'
22°
28°
Very cold
Cold
B
B'
A
A'
Warm


TRIPLE POINT
Altitude (km)
5
4
3
2
1
0
Warm
Very cold
Cold
B
B'
(b)
Initial occlusion


Precipitation
C
C'
22°
28°
Very cold
Cold
B
B'
A
A'
Warm

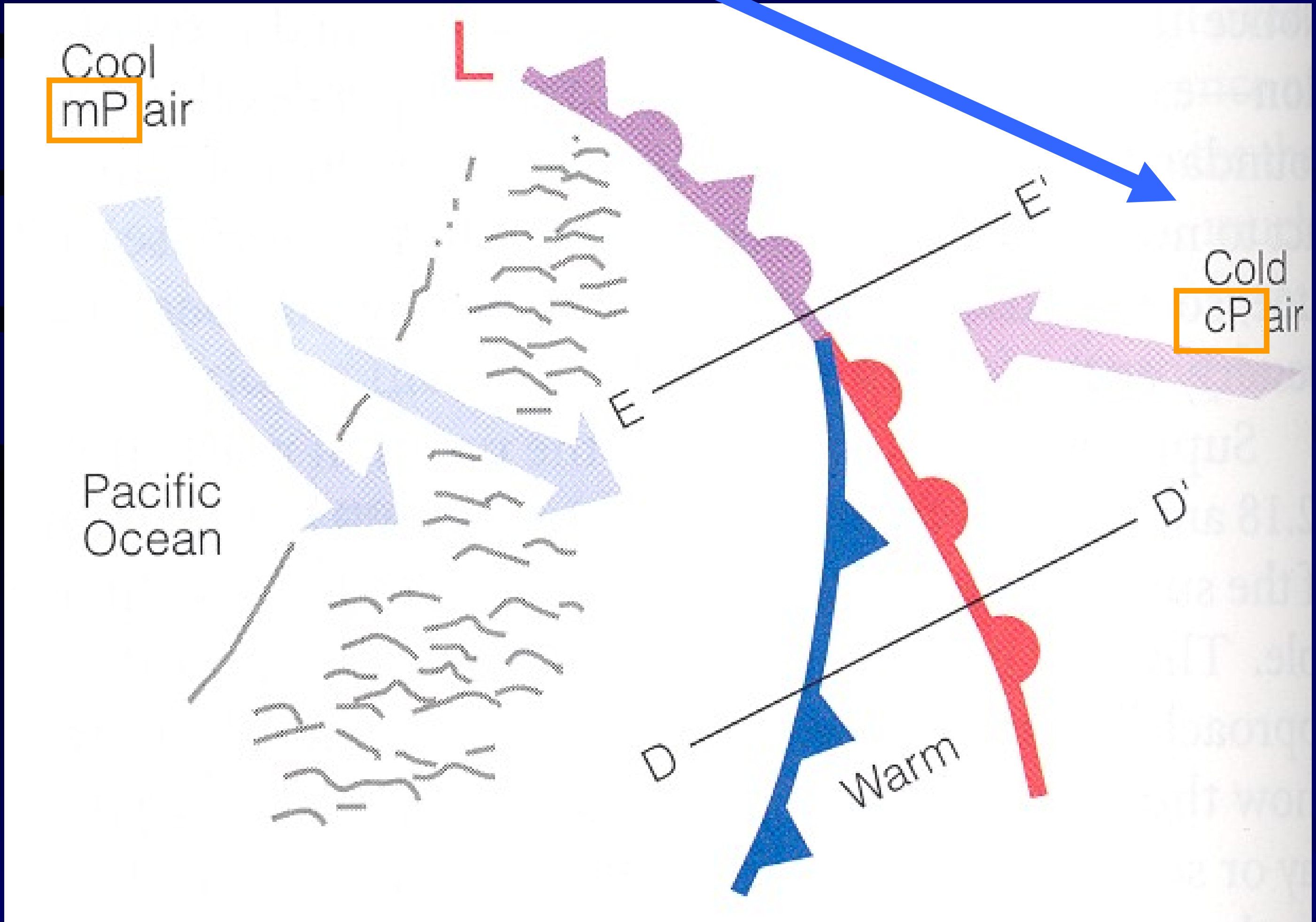

Altitude (km)
5
4
3
2
1
0
Warm
Very cold
Cold
C
C'
(c)
Cold occluded front

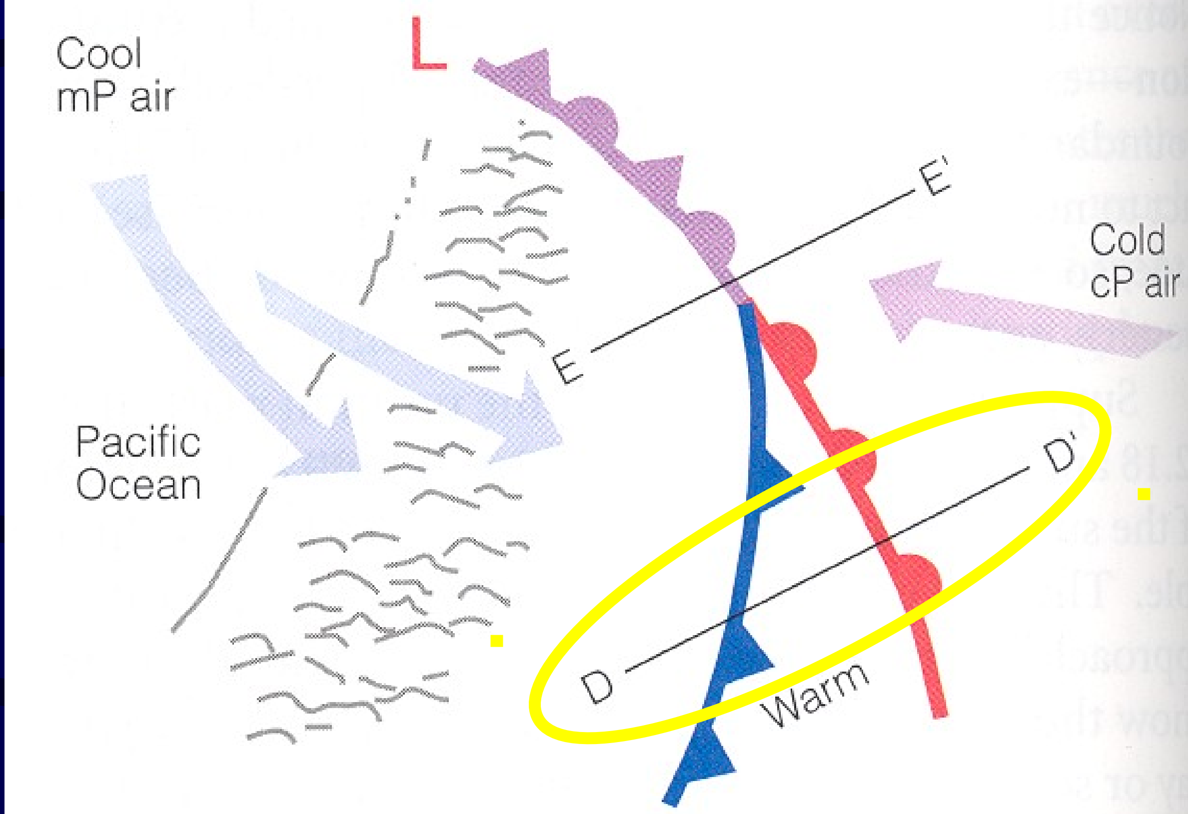
Colder air behind the occlusion plows into
the cooler air ahead of the front,
similar to a cold front.

Source: Chad Palmer, USATODAY.com Weather team, gr
David Evans

Warm-type Occluded Front:

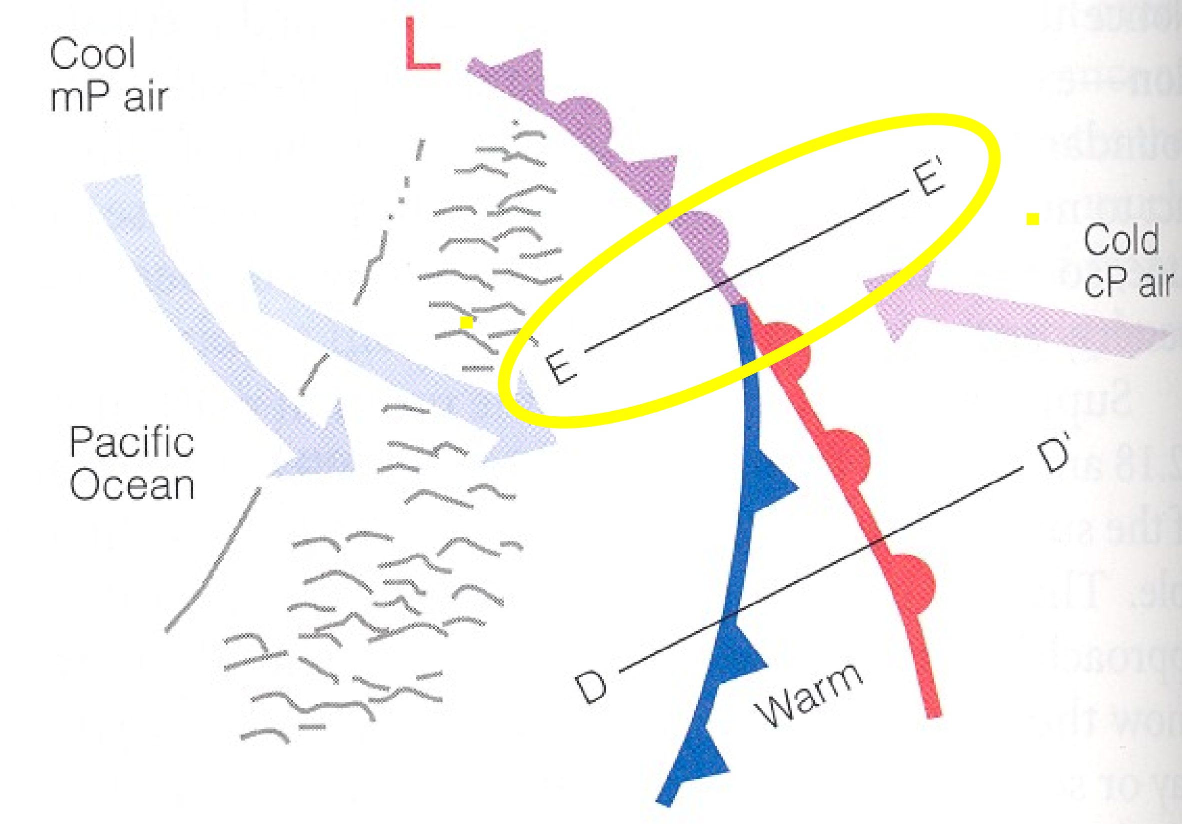
When the air behind the occlusion is cool compared to the cold air ahead of it.

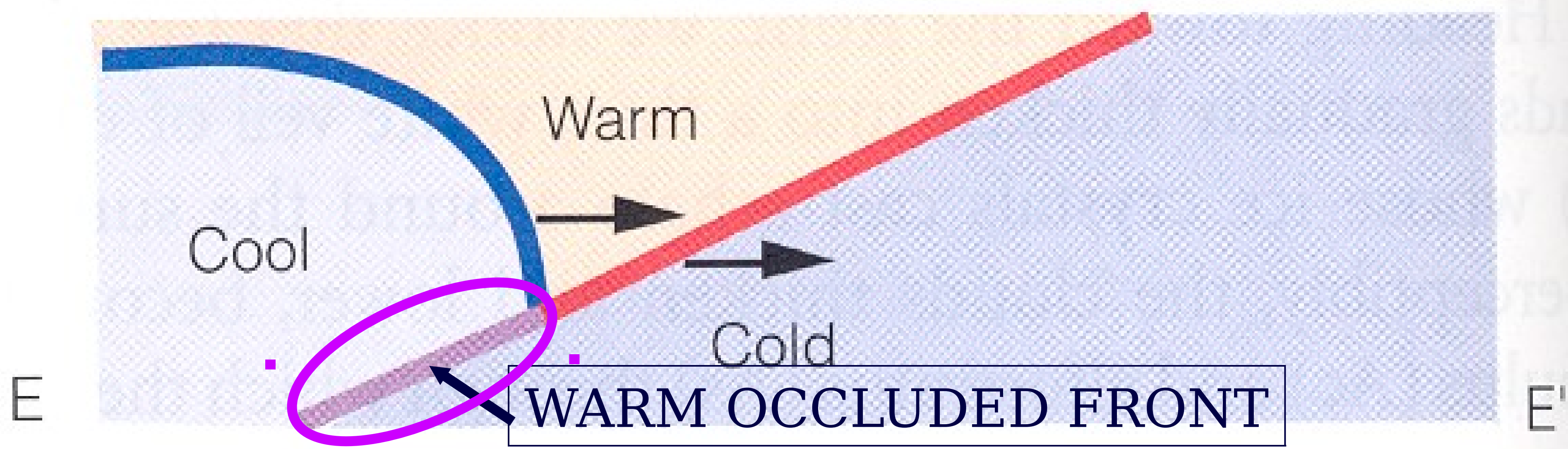


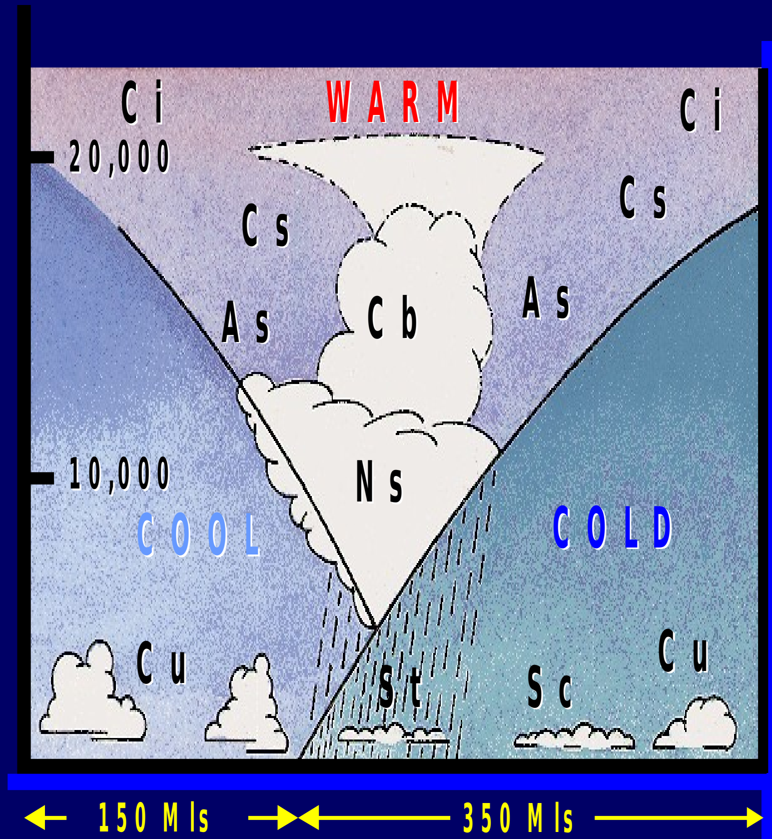

L
Cool
mP air
Pacific
Ocean
E
E'
Cold
cP air
D
D'
Warm


Side View
Cool
Warm
Cold
D
D'

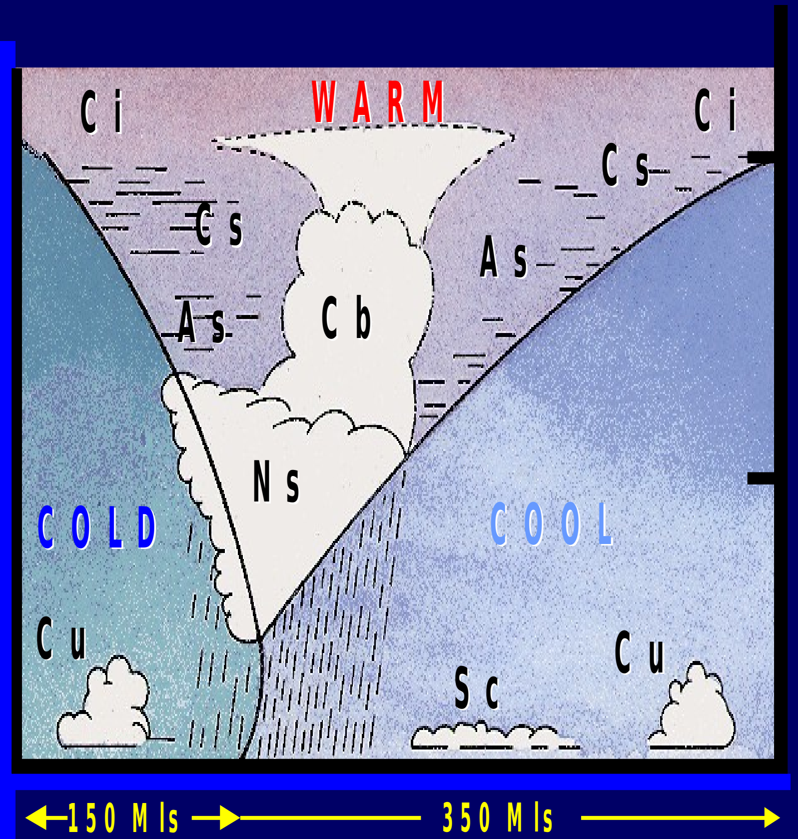
- Notice how the cool air is lifted above the colder air ahead of the warm front







WARM OCCLUSION
RAIN AHEAD OF SURFACE
OCCLUSION



COLD OCCLUSION
RAIN BELT BOTH SIDES
OF SURFACE OCCLUSION

Cool air behind the occlusion, rises up and over the colder air ahead of the front.

Source: Chad Palmer, USATODAY.com Weather team, gr
David Evans

Associated with Occluded Fronts…

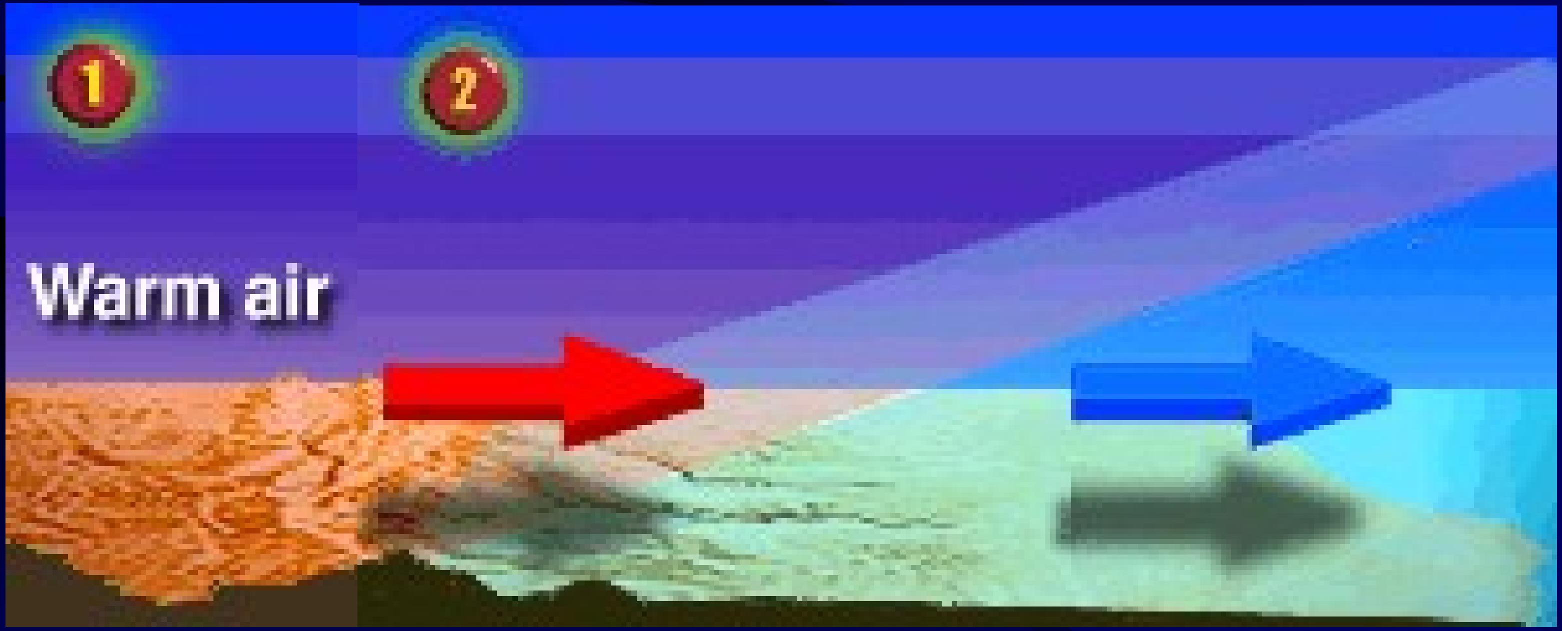
TABLE 12.4 Typical Weather Most Often Associated with Occluded Fronts

WEATHER ELEMENT	BEFORE PASSING	WHILE PASSING	AFTER PASSING
Winds	East, southeast, or south	Variable	West or northwest
Temperature			
Cold type	Cold or cool	Dropping	Colder
Warm type	Cold	Rising	Milder
Pressure	Usually falling	Low point	Usually rising
Clouds	In this order: Ci, Cs, As, Ns	Ns, sometimes Tcu and Cb	Ns, As, or scattered Cu
Precipitation	Light, moderate, or heavy precipitation	Light, moderate, or heavy continuous precipitation or showers	Light-to-moderate precipitation followed by general clearing
Visibility	Poor in precipitation	Poor in precipitation	Improving
Dew point	Steady	Usually slight drop, especially if cold-occluded	Slight drop, although may rise a bit if warm-occluded

Know the differences between a cold typ
warm type occluded front.

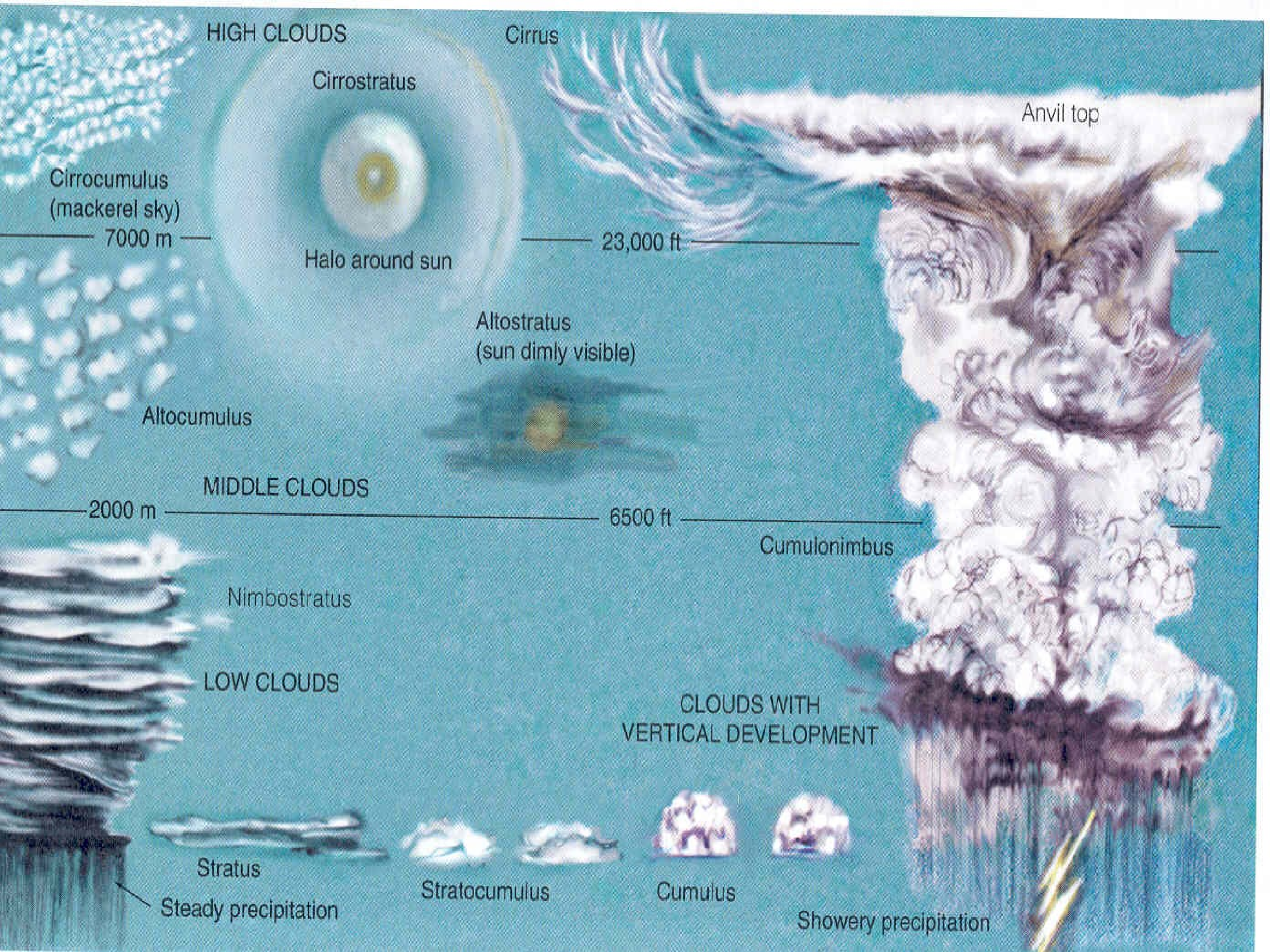
What are the 5 ways of locating a front on a surface weather map?

1. Sharp temperature changes over a relatively short distance
2. Changes in the air's moisture content (changes in dew point)
3. Shifts in wind direction
4. Clouds and precipitation patterns
5. Pressure and pressure changes



Source: USA TODAY research by Chad Palmer, Graphic by John F

CLOUDS


HIGH CLOUDS
Cirrus
Cirrostratus
Anvil top
Cirrocumulus
(mackerel sky)
7000 m
Halo around sun
23,000 ft
Altostratus
(sun dimly visible)
Altocumulus
MIDDLE CLOUDS
2000 m
6500 ft
Cumulonimbus
Nimbostratus
LOW CLOUDS
CLOUDS WITH
VERTICAL DEVELOPMENT
Stratus
Steady precipitation
Stratocumulus
Cumulus
Showery precipitation

CLASSIFICATION OF CLOUDS

- HEIGHT OF BASE

CLASSIFICATION OF CLOUDS

- <u>HEIGHT OF BASE</u>
  - HIGH (*CIRRO-*)

Cirrus

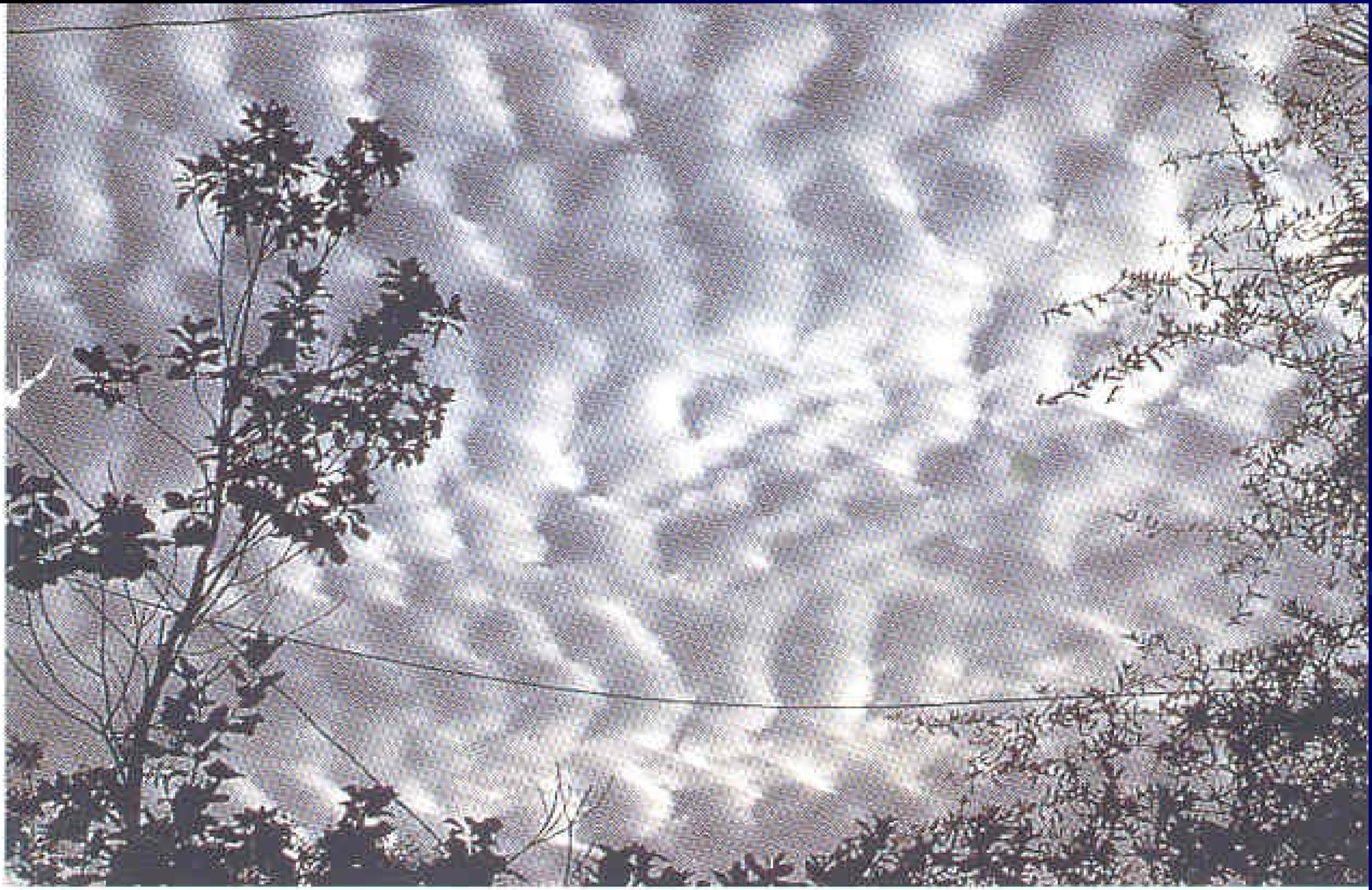
Cirrus

CLASSIFICATION OF CLOUDS

- <u>HEIGHT OF BASE</u>
  - HIGH (*CIRRO-*)
  - MEDIUM (*ALTO-*)

Alto-Stratus

Alto-Cumulus



CLASSIFICATION OF CLOUDS

- <u>HEIGHT OF BASE</u>
  - HIGH (*CIRRO-*)
  - MEDIUM (*ALTO-*)
  - LOW

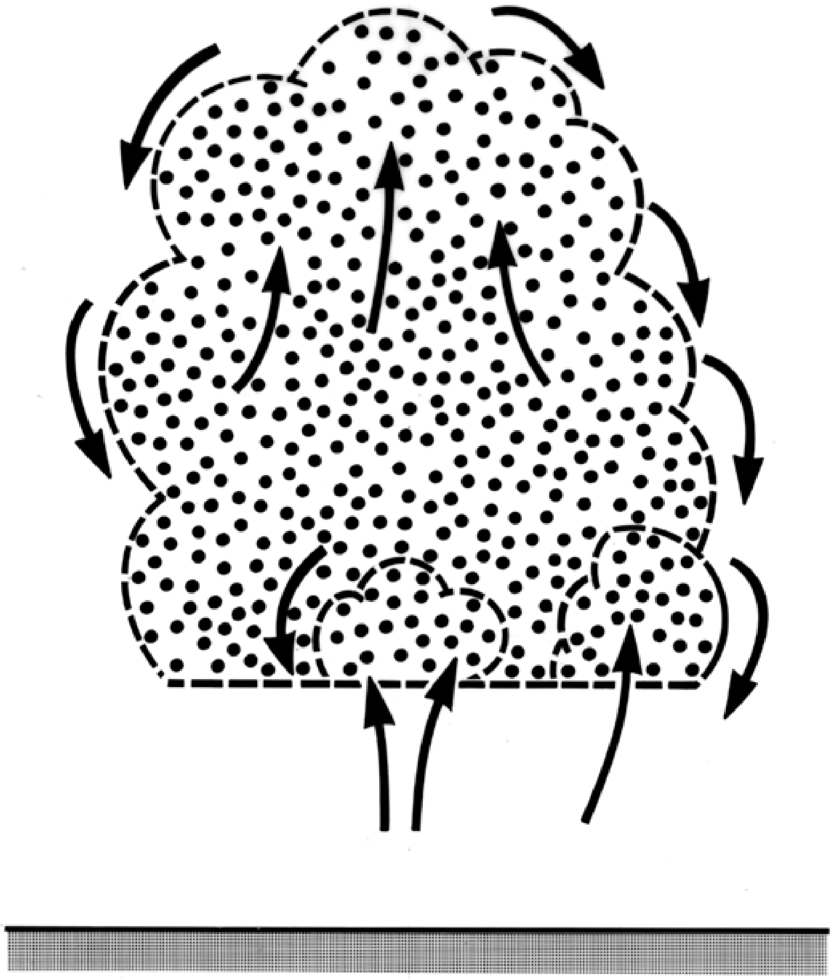
CLASSIFICATION OF CLOUDS

- HEIGHT OF BASE
  - HIGH (*CIRRO-*)
  - MEDIUM (*ALTO-*)
  - LOW
- FORMING PROCESS

CLASSIFICATION OF CLOUDS

- HEIGHT OF BASE
  - HIGH (*CIRRO-*)
  - MEDIUM (*ALTO-*)
  - LOW
- FORMING PROCESS
  - CONVECTIVE (*CUMULI-FORM*)

CONVECTION CLOUD



Cumulus Fractus

Cumulus Congestus

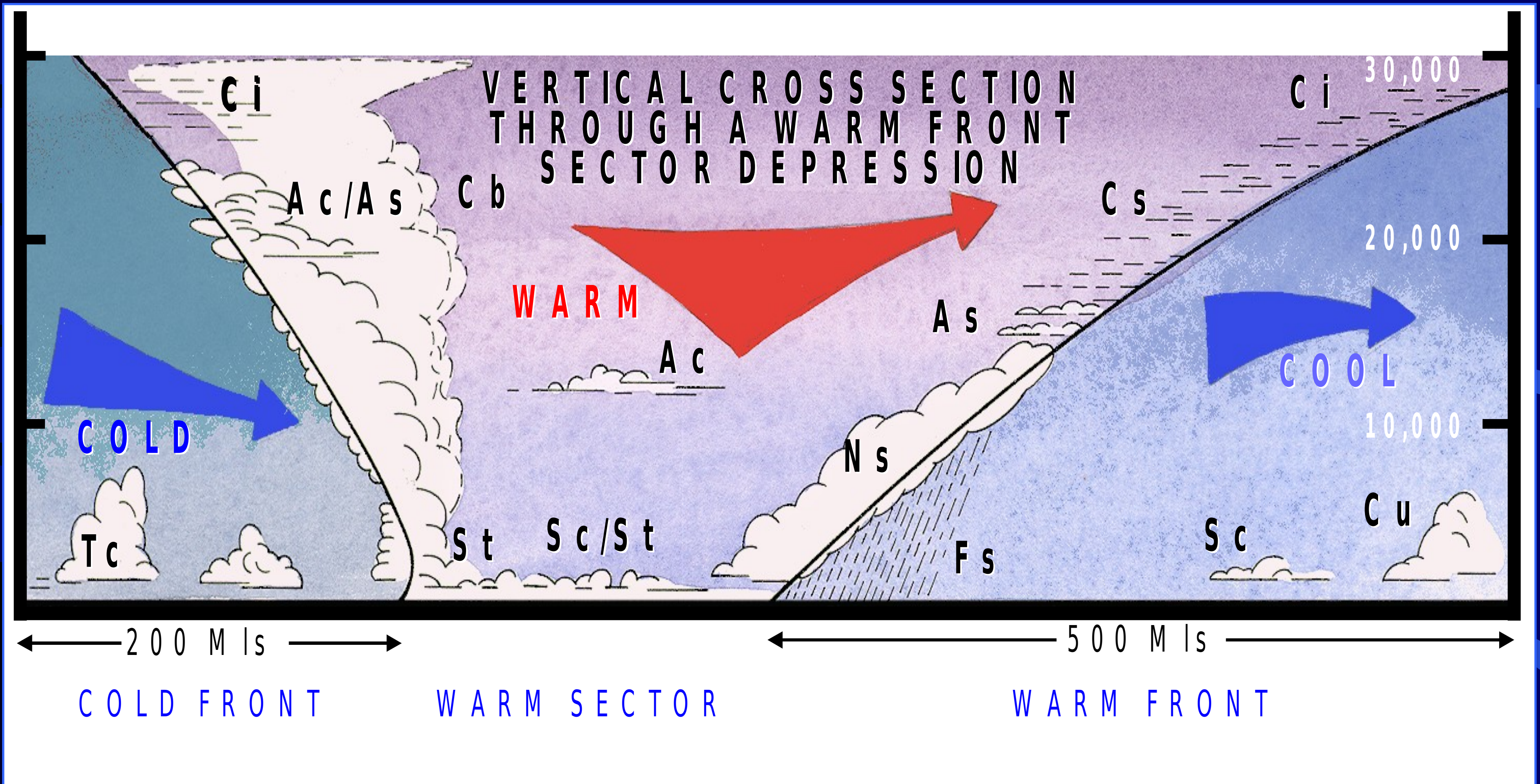
Towering Cumulus

CLASSIFICATION OF CLOUDS

- <u>HEIGHT OF BASE</u>
  - HIGH (*CIRRO-*)
  - MEDIUM (*ALTO-*)
  - LOW
- <u>FORMING PROCESS</u>
  - CONVECTIVE (*CUMULI-FORM*)
  - NON-CONVECTIVE (*STRATI-FORM*)

Stratus

Strato-Cumulus



VERTICAL CROSS SECTION
THROUGH A WARM FRONT
SECTOR DEPRESSION
Ci
Ac/As
Cb
WARM
Ac
As
Cs
Ci
30,000
20,000
10,000
COOL
COLD
Tc
St
Sc/St
Ns
Fs
Sc
Cu
200 Mls
500 Mls
COLD FRONT
WARM SECTOR
WARM FRONT

Wind and Waves

Wind and Waves

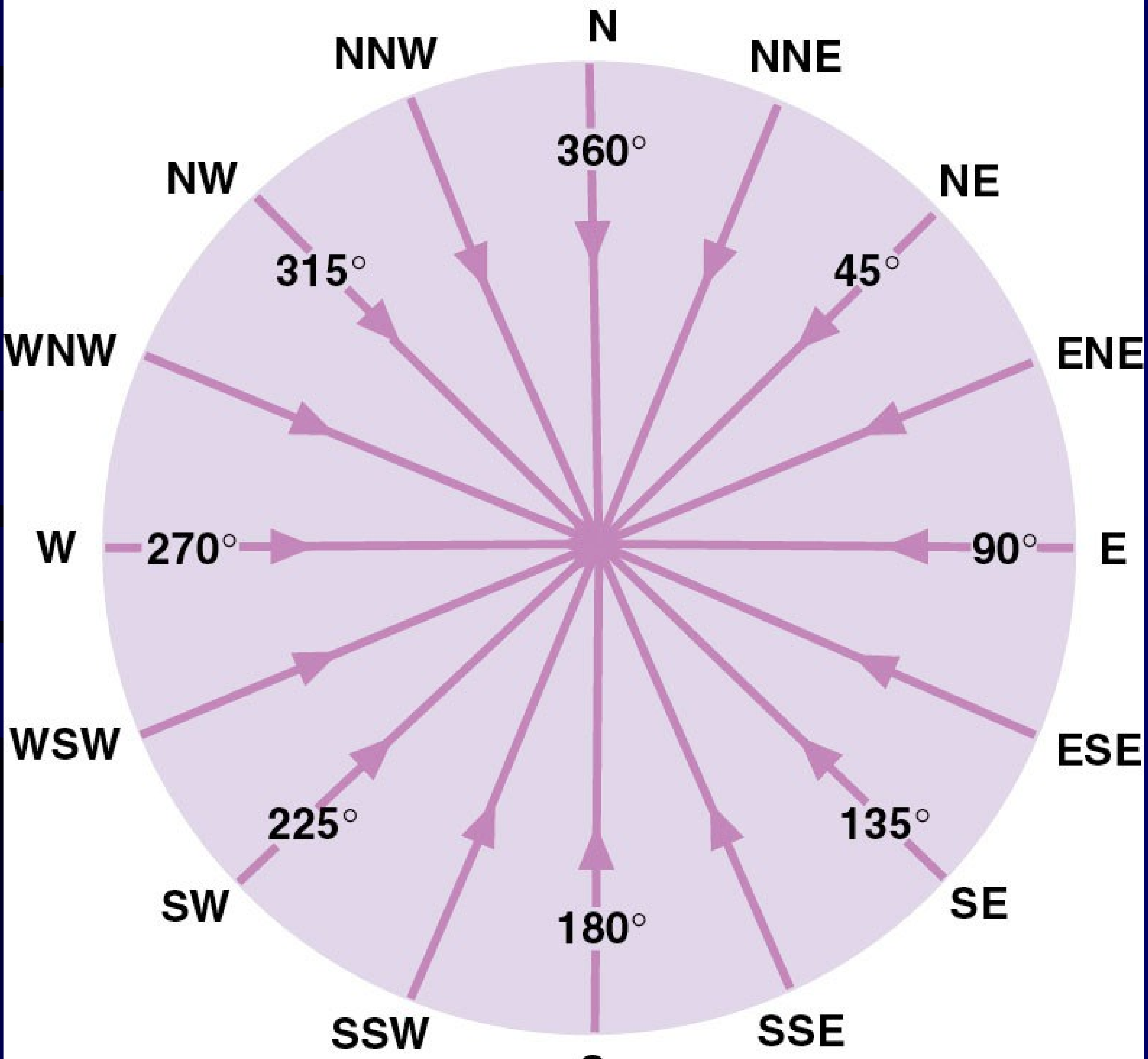
- Waves forming by wind blowing over the water surface = wind waves
- As wind waves move into a region of weaker winds, their crests become lower and more rounded = swells
- Waves are created as frictional drag of the wind transfers energy to the water.

Wind speed ↑ , ↑ Energy, thus Wave Hgt ↑

- Amount of Energy Depends on 3 factors:
  - Wind speed
  - Length of *time* that the wind blows over the water
  - *Fetch,* or distance, of deep water over which the wind blows

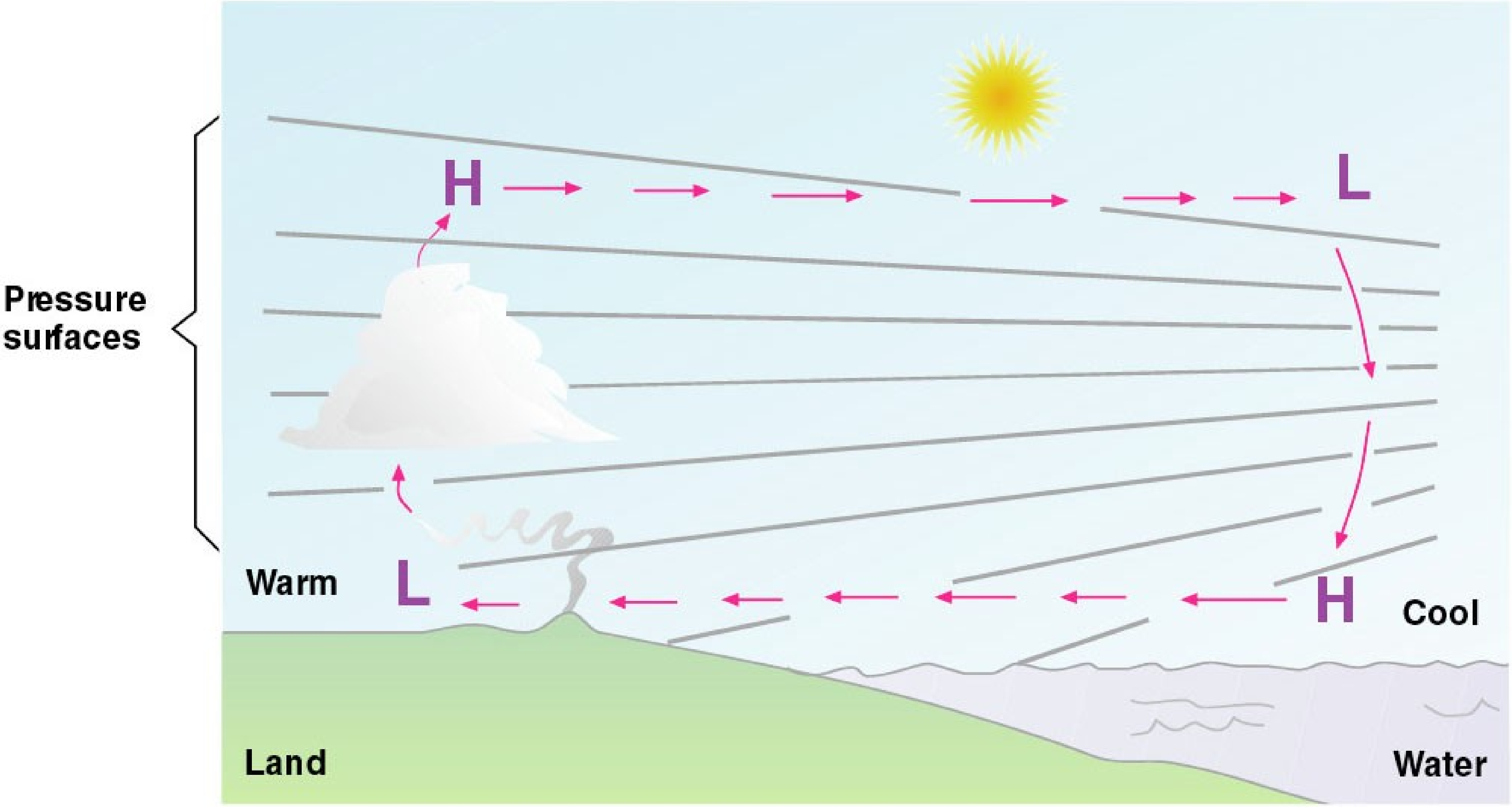
Determining Wind Direction & Speed

- Wind direction is given as the direction (toward/from) which it is blowing
- Onshore vs Offshore winds
  - Onshore – from water to land “Seabreeze”
  - Offshore – from land to water “Landbreeze”
- Prevailing wind: the direction most often observed during a given time period

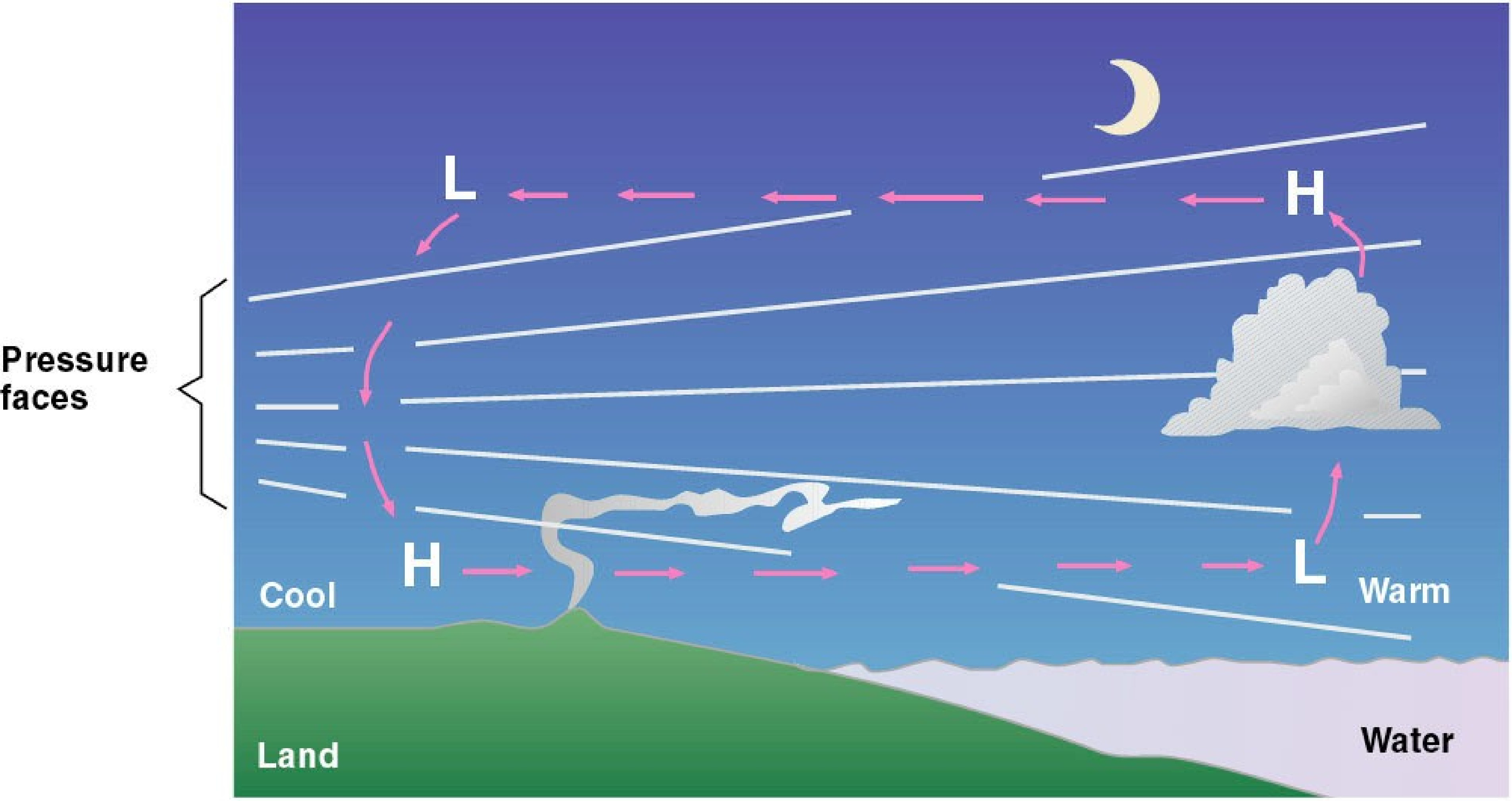

N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
360°
45°
90°
135°
180°
225°
270°
315°

Sea Breeze & Land Breeze

- Types of thermal circulation - what scale?
- Uneven heating rates of land and water is due to?
  - Higher specific heat capacity of water vs land
- Which occurs during the day? The night?
- Demonstrate the setup for a sea/land breeze
- Overall effect: Pressure distribution due to thermal heating/cooling creates the sea/land breeze



(a) Sea breeze



(b) Land breeze

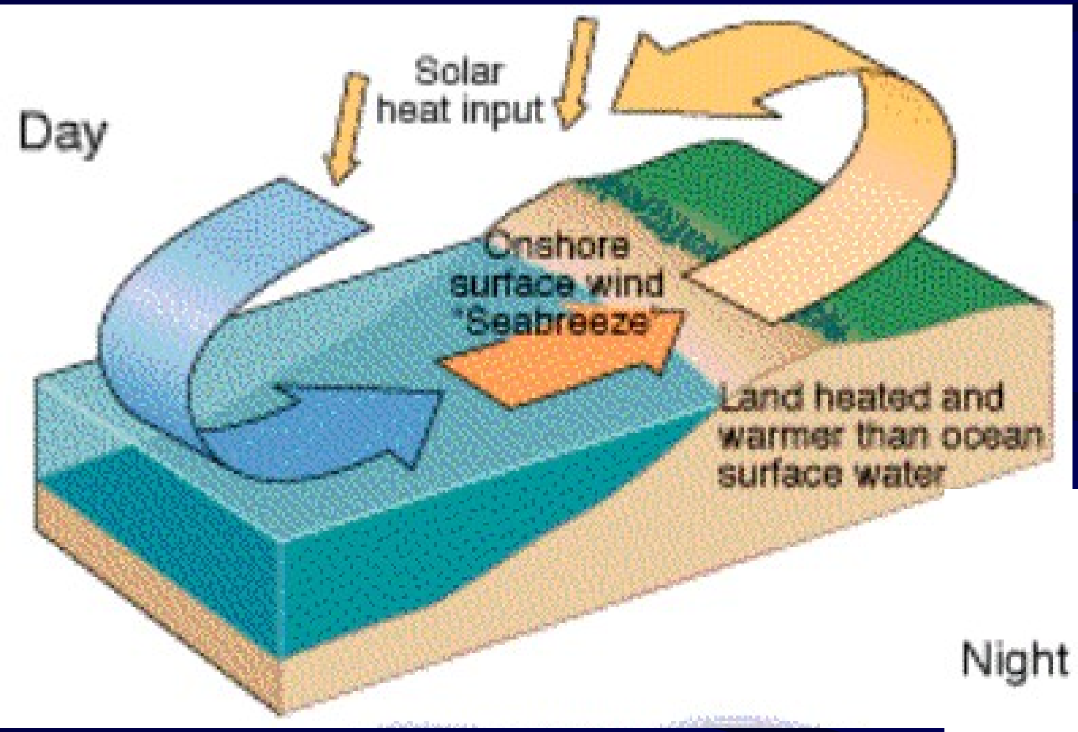
Sea Breeze vs Land Breeze

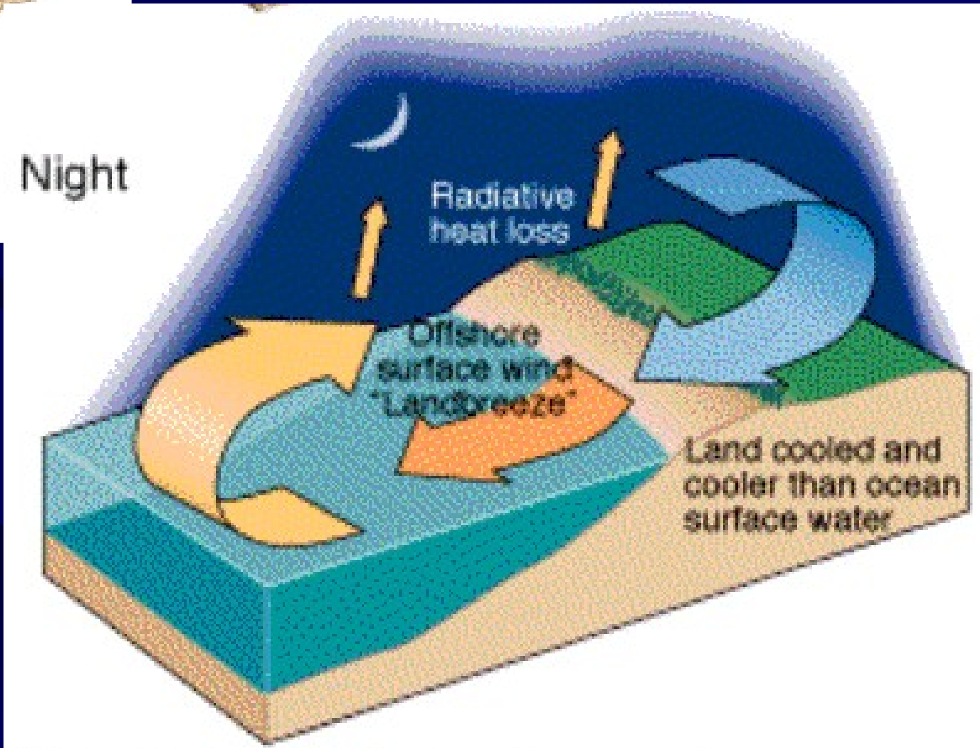
- Which is stronger? Why?
  - Sea breeze: Temperature contrast between land and water are much larger during the day compared to the night
- Where do convective clouds form?
  - Where you have *upward* vertical motions…
  - Over land for a sea breeze; over the water for a land breeze

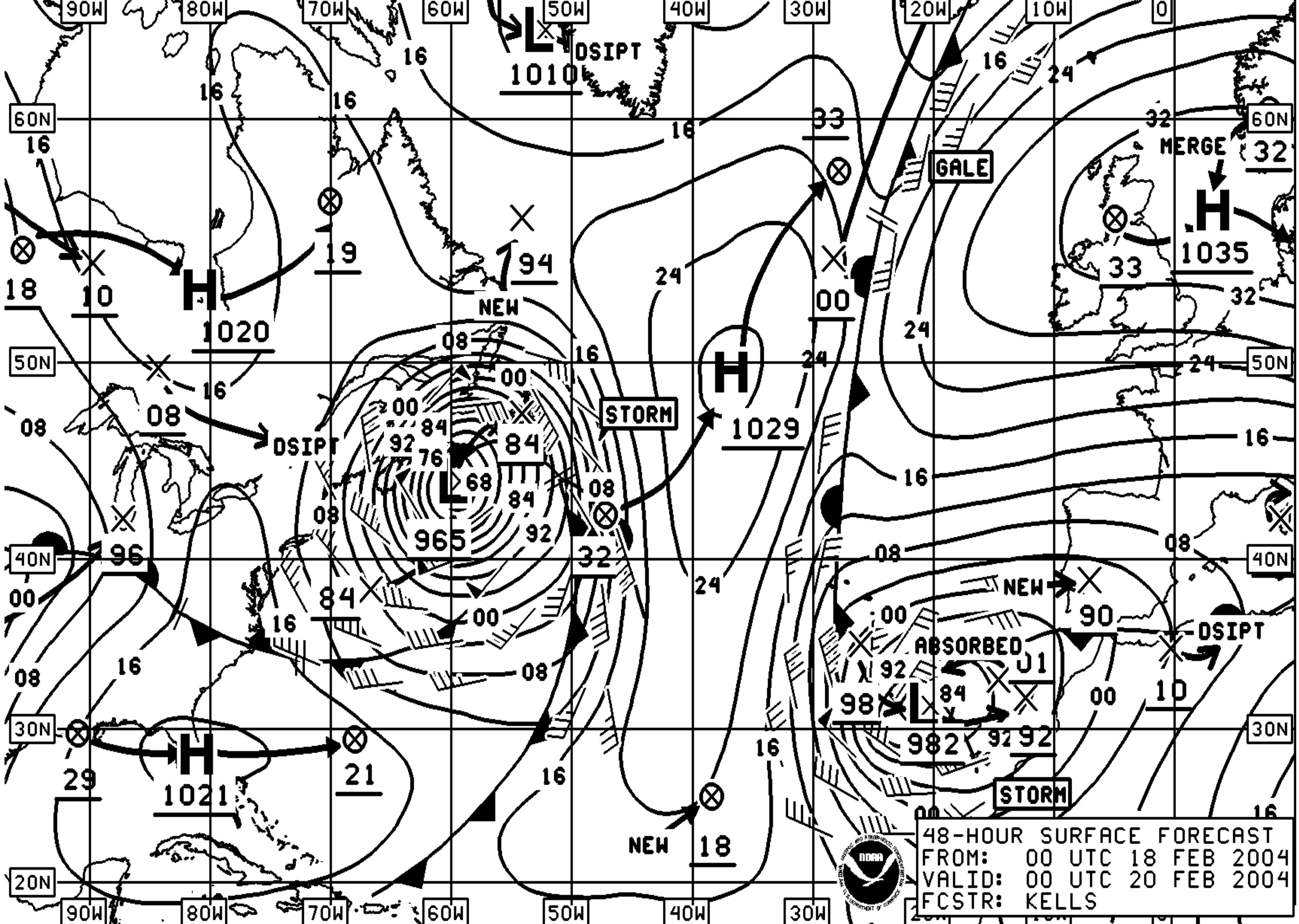
Passage of the sea breeze…

- By identifying its sea breeze front…
  - Wind shift from west to east along the *East Coast*
  - A “smoke” front or “smog” front if the ocean air is highly concentrated with pollutants, nuclei
  - If the ocean air becomes *saturated*, a mass of low clouds and fog mark the leading edge
  - If conditionally unstable atm exists, thunderstorms may form.
  - A few km away from the coast, thunderstorms may develop. Why?
    - Due to the *upward* vertical motion that completes the sea breeze circulation

Seabreeze / Landbreeze



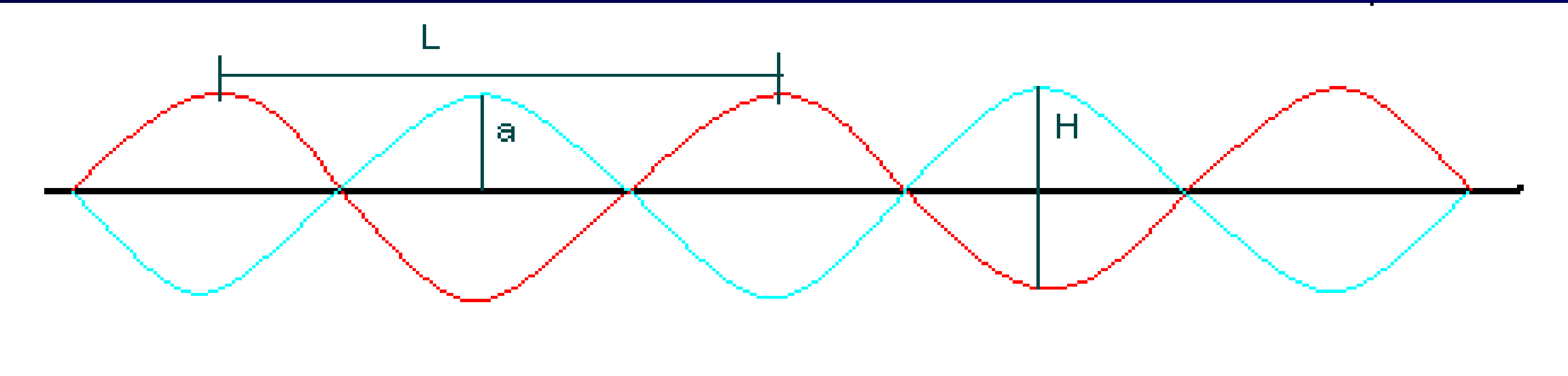




NWS/NCEP - Ocean Prediction Center
www.opc.ncep.noaa.gov

Waves and Swell

Definitions



- Wavelength (L) - horizontal distance between consecutive crests
- Amplitude (a) - one half of the wave height.
- Wave height (H) - distance between crest and trough.
- Wave period - time interval between successive troughs or crests.
- Significant wave height - average height of the third of the waves.

Type of waves

- Wind Waves (Sea) - Gravity waves generated by wind blowing over the sea surface. They appear to be short-crested, with many different heights, lengths and periods identifiable.

- Capillary Waves - The surface of relatively quiet water, reveal very small wave disturbances which have distinctly different appearance from small wind waves.

- Swell - These represent wind waves which have traveled out of the area they were generated, or can no longer be sustained by the winds in the generating area.

Types of waves

- Tides - behave as long waves and are influenced by the configuration of basins and the coriolis force.
- Storm Tides - Persistence winds combined with high tides and low pressure, pile up water giving unusually high sea levels. These effects are treated like long period waves.
- Seiches - Are generated by changes in met conditions and tidal forces, and are the oscillations set up in a body of water.
- Tsumamis - Waves caused by seismic disturbances on the sea bed.

Sea Waves

- To forecast sea wave characteristics at a point the following info is needed:
  - Wind Velocity
  - Duration of wind
  - Fetch area

Typical Fetches

- Area of sea, where a constant wind is blowing, or has been blowing

- Fetch boundaries:
  - coastlines
  - met fronts
  - isobaric curvature A
  - fanning out of boundaries B

Wind and Sea Scale for Fully Arisen Sea

WIND AND SEA SCALE FOR FULLY ARISEN SEA

SEA-GENERAL		WIND			SEA									
SEA STATE	DESCRIPTION	BEAUFORT WIND FORCE	DESCRIPTION	RANGE (KNOTS)	WIND VELOCITY (KNOTS)	WAVE HEIGHT FEET: AVERAGE	WAVE HEIGHT FEET: SIGNIFICANT	WAVE HEIGHT FEET: AVERAGE 1/10 HIGHEST	SIGNIFICANT RANGE OF PERIODS (SECONDS)	(PERIOD OF MAXIMUM ENERGY OF SPECTRUM)	AVERAGE PERIOD	AVERAGE WAVE LENGTH	MINIMUM FETCH (NAUTICAL MILES)	MINIMUM DURATION (HOURS)
0	Sea like a mirror.	U	Calm	Less than	0	0	0	0	-	-	-	-	-	-
	Ripples with the appearance of scales are formed, but without foam crests.	1	Light Airs	1 - 3	2	0.05	0.08	0.10	up to 1.2 sec	0.7	0.5	10 in.	5	18 min
	Small wavelets, still short but more pronounced; crests have a glassy appearance, but do not break.	2	Light Breeze	4 - 6	5	0.18	0.29	0.37	0-4-2.8	2.0	1.4	6.7 ft	8	39 min
1	Large wavelets, crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.	3	Gentle Breeze	7 - 10	8.5	0.6	1.0	1.2	0-8-5.0	3.4	2.4	20	9.8	1.7 hrs
					10	0.88	1.4	1.8	1,0-6.0	4	2.9	27	10	2.4
2	Small waves, becoming larger; fairly frequent white horses.	4	Moderate Breeze	11-16	12	1.4	2.2	2.8	1.0-7.0	4.8	3.4	40	18	3.8
					13.5	1.8	2.9	3.7	1.4-7.6	5.4	3.9	52	24	4.8
3					14	2.0	3.3	4.2	1.5-7.8	5.6	4.0	59	28	5.2
					16	2.9	4.6	5.8	2.0-8.8	6.5	4.6	71	40	6.6
4	Moderate waves, taking a more pronounced long form; many white horses are formed. (Chance of some spray).	5	Fresh Breeze	17-21	18	3.8	6.1	7.8	2.5-10.0	7.2	5.1	90	55	8.3
					19	4.3	6.9	8.7	2.8-10.6	7.7	5.4	99	65	9.2
					20	5.0	8.0	10	3.0-11.1	8.1	5.7	111	75	10
5	Large waves begin to form; the white foam crests are more extensive everywhere. (Probably some spray).	6	Strong Breeze	22-27	22	6.4	10	13	3.4-12.2	8.9	6.3	134	100	12
					24	7.9	12	16	3.7-13.5	9.7	6.8	160	130	14
6					24.5	8.2	13	17	3.8-13.6	9.9	7.0	164	140	15
					26	9.6	15	20	4.0-14.5	10.5	74	188	180	17
	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind. (Spindrift begins to be seen).	7	Moderate Gale	28-33	28	11	18	23	4.5-15.5	11.3	7.9	212	230	20
					30	14	22	28	4.7-16.7	12.1	8.6	250	280	23
					30.5	14	23	29	4.8-17.0	12.4	8.7	258	290	24
					32	16	26	33	5.0-17.5	12.9	9.1	285	340	27
7	Moderately high waves of greater length; edges of crests break into spindrift. The foam is blown in well marked streaks along the direction of the wind. Spray effects visibility.	8	Fresh Gale	34-40	34	19	30	38	5.5-18.5	13.6	9.7	322	420	30
					36	21	35	44	5.8-19.7	14.5	10.3	363	500	34
					37	23	37	46.7	6.20.5	14.9	10.5	376	530	37
					38	25	40	50	6.2-20.8	15.4	10.7	392	600	38
					40	28	45	58	6.5-21.7	16.1	11.4	444	710	42
8	High waves. Dense streaks of [illegible] along the direction of the wind. Sea begins to roll. Visibility affected.	9	Strong Gale	41-47	42	31	50	64	7-23	17.0	12.0	492	830	47
					44	36	58	73	7-24.2	17.7	12.5	534	960	52
					46	40	64	81	7-25	18.6	13.1	590	1110	57
9	Very high waves with long overhanging crests. The resulting foam is in great patches and is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes a white appearance. The rolling of the sea becomes heavy and shock-like. Visibility is affected.	10	Whole Gale	48-55	48	44	71	90	7.5-26	19.4	13.8	650	1250	63
					50	49	78	99	7.5-27	20.2	14.3	700	1420	69
					51.5	52	83	106	8-28.2	20.8	14.7	736	1560	73
					52	54	87	110	8-28.5	21.0	14.8	750	1610	75
					54	59	95	121	8-29.5	21.8	15.4	810	1800	81
	Exceptionally high waves (Small and medium-sized ships might for a long time be lost to view behind the waves.) The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	11	Storm	56-63	56	64	103	130	8-5-31	22.6	16.3	910	2100	88
					59.5	73	116	148	10-32	24	17.0	985	2500	101
	Air filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.	12	Hurricane	64-71.	>64	>80	>128	>164	101(35)	(26)	(18)	~	~	~

Duration Limited Graph

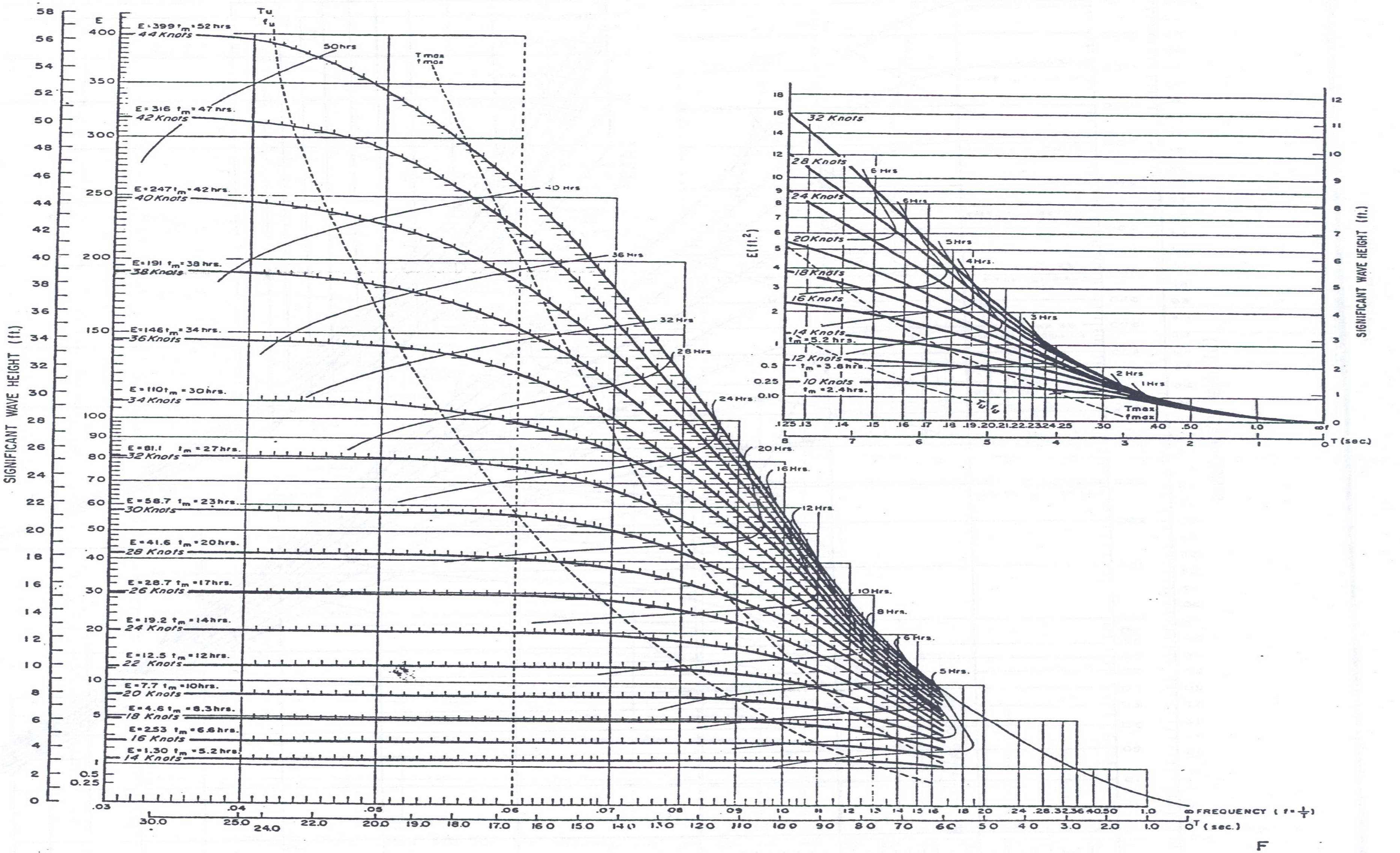
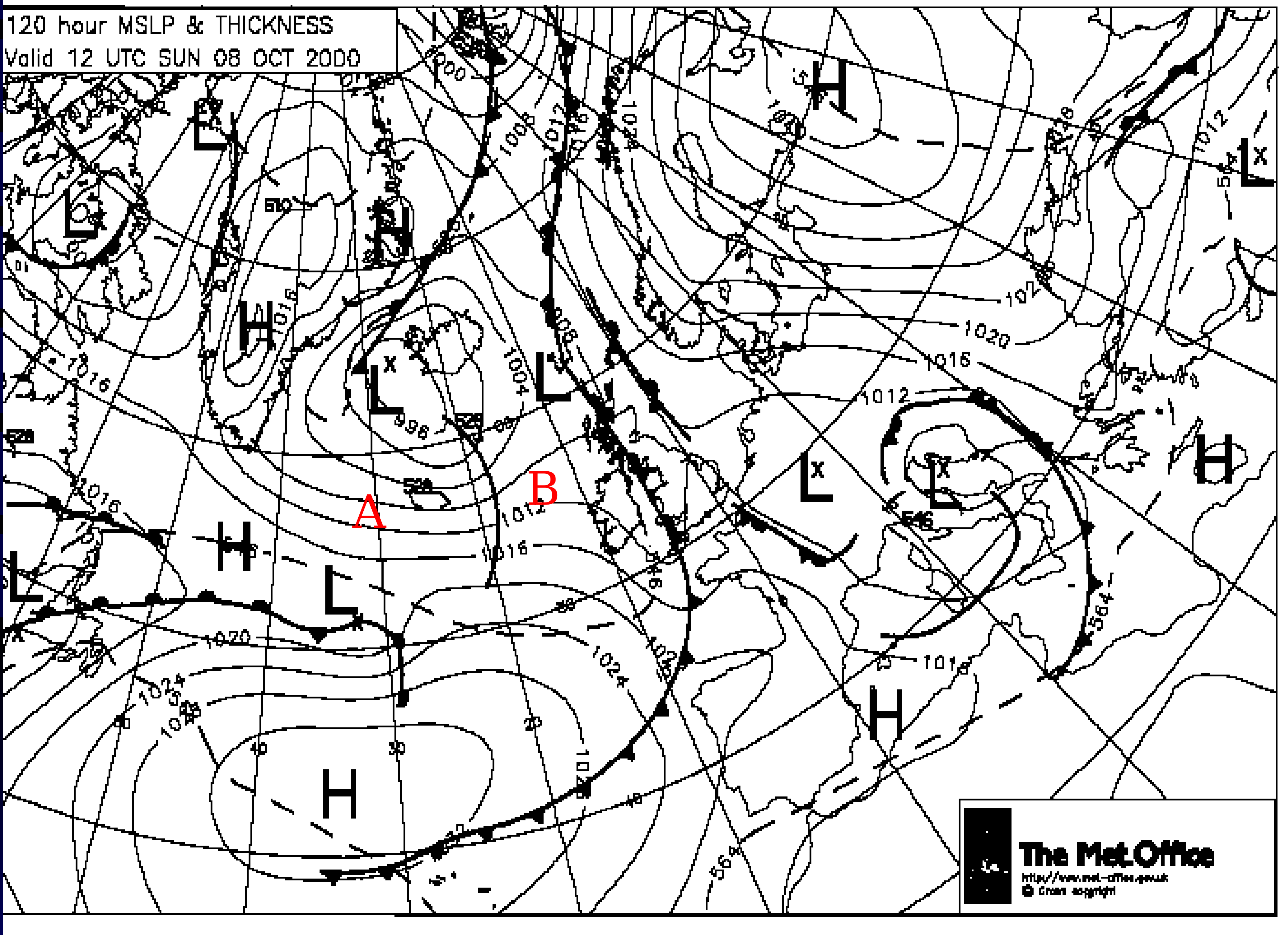


Figure 14-7.—Sea and swell graph 1a. Distorted C. C. S. (duration graph-wind speeds 10-44 knots).

AG.680



120 hour MSLP & THICKNESS
Valid 12 UTC SUN 08 OCT 2000
A
B
H
L
1016
1012
1020
1024
1004
996
The Met.Office
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Change of wind direction

- When wind direction changes two things will happen:
  - The new wind will build up a new sea, causing a confused sea for a time.
  - If wind changes direction by less than 30º then wave characteristics are calculated as if there had been no change in wind direction.

Fully Developed Sea

- Development is subject to duration and fetch.
- If development is curtailed by lack of time, it is ‘duration limited’.
- If development is curtailed by lack of fetch, it is ‘fetch limited’.
- A fully arisen sea from calm to gale force will take approximately 24 hrs.

Swell

- Once the wind which produced the SS alters direction or speed, then the sea will decay as swell, using 2 processes:
  - Dispersion
  - Angular Spreading

Shallow water

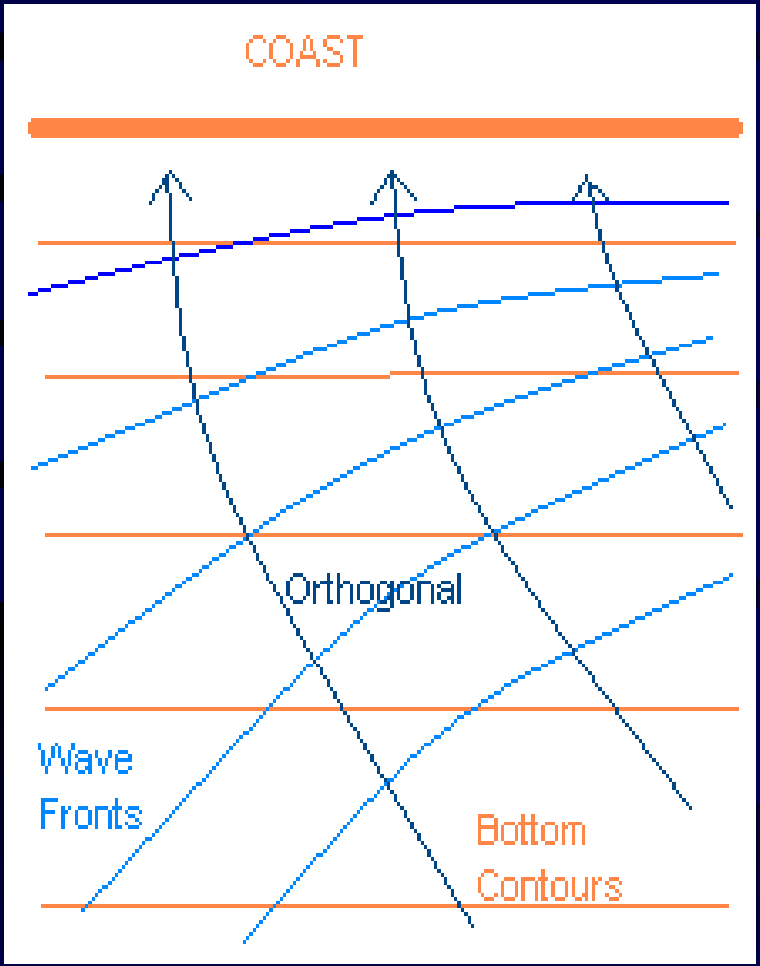
- Lower frequency wave are effected by the seabed.
- Waves are effected when the depth of water is less than half the wavelength of the waves.

Effects of shallow water

- Interaction with the seabed will cause energy loss through frictional effects, acting as a low frequency cut-off.

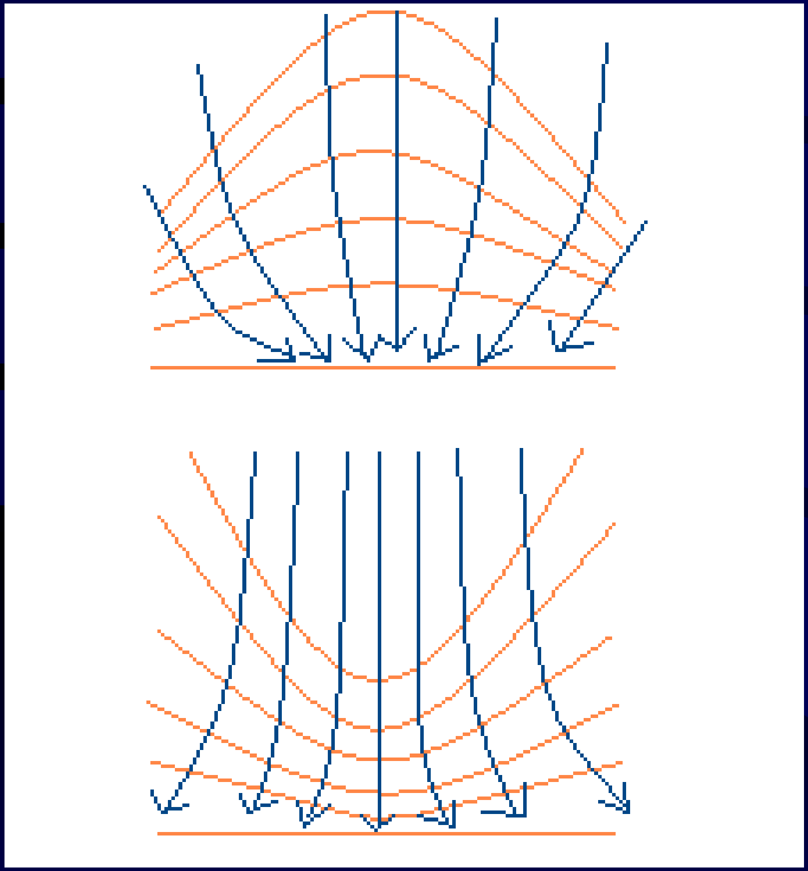
- Lines of waves moving obliquely towards the shore line, are subject to progressive, curving and refraction.

Refraction of waves



- The figure illustrates the effect of refraction of a simple wave.
- The Orthogonal represents the direction wave fronts travel.
- Orthogonals become curved during the process of refraction, tending to converge or diverge.

Wave refraction



- Convergence at the head of a submarine ridge.
- Divergence at the head of a submarine valley.

Sea State Presentation

Sea State	Number	Wind Force	Wave Height(m)
Calm(glassy)	0	0	0
Calm(rippled)	1	1	0 - 0.1
Smooth(wavelets)	2	2/3	0.1 - 0.5
Slight	3	3/4	0.5 - 1.25
Moderate	4	4/5	1.25 - 2.5
Rough	5	6	2.5 - 4.0
Very Rough	6	7/8	4.0 - 6.0
High	7	8/9	6.0 - 9.0
Very High	8	10	9.0 - 14.0
Phenomenal	9	10+	>14.0

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Very High	8	10	9.0 - 14.0
Phenomenal	9	10+	>14.0

Swell Forecast Presentation

- Swell Wavelength:
  - Short less up to 300ft (with a period of than 7.6 sec)
  - Average 300-600ft (period of 7.6 to 10.8sec)
  - Long than over 600ft (period greater 10.8 sec)

Swell Forecast Presentation

- Swell Height:

– Very Low	1m or less	3.3ft or less
– Low	1-2m	3.3-6.6ft
– Moderate	2-4m	6.6-13ft
– Heavy	over 4m	over 13ft

  - Swell direction is given to the nearest two compass points

HF WxFax

NATIONAL WEATHER SERVICE/USCG BOSTON RADIOFAX SCHEDULE PART 1 - EFFECTIVE 28 NOV 00

TIME	AREA	CHART	TIME	AREA	CHART
0230Z		TEST PATTERN	0951Z	6	SATELLITE PICTURE
0233Z	1	00Z PRELIM SFC ANAL	1002Z	2	RETRANSMIT 0925Z
0243Z		SCHEDULE PART 1	1015Z	3	RETRANSMIT 0938Z
0254Z		SCHEDULE PART 2	1028Z		END TRANSMISSION
0305Z		REQ FOR COMMENTS	1400Z		TEST PATTERN
0315Z	1	00Z SEA STATE ANAL	1405Z		SCHEDULE PART 1
0325Z	2	00Z SFC ANAL PART 1	1420Z		SCHEDULE PART 2
0338Z	3	00Z SFC ANAL PART 2	1433Z		REQ FOR COMMENTS
0351Z	5	SATELLITE PICTURE	1443Z		PRODUCT NOTICE BUL
0402Z	2	RETRANSMIT 0325Z	1453Z	1	12Z PRELIM SFC ANAL
0415Z	3	RETRANSMIT 0338Z	1503Z	5	SATELLITE PICTURE
0428Z	4	00Z 500 MB ANALYSIS	1515Z	1	12Z SEA STATE ANAL
0438Z		END TRANSMISSION	1525Z	2	12Z SFC ANAL PART 1
0745Z		TEST PATTERN	1538Z	3	12Z SFC ANAL PART 2
0755Z	1	06Z PRELIM SFC ANAL	1551Z		END TRANSMISSION
0805Z	1	24HR SFC VT 00Z	1600Z		ICE CHARTS
0815Z	1	24HR WIND/WV VT 00Z	1720Z		TEST PATTERN
0825Z	1	24HR 500 MB VT 00Z	1723Z	2	RETRANSMIT 1525Z
0835Z	4	36HR 500 MB VT 12Z	1736Z	3	RETRANSMIT 1538Z
0845Z	4	48HR 500 MB VT 00Z	1749Z	4	12Z 500 MB ANALYSIS
0855Z	4	48HR SFC VT 00Z	1759Z	4	12Z SEA STATE ANAL
0905Z	4	48HR WIND/WV VT 00Z	1809Z		END TRANSMISSION
0915Z	4	48HR WV PERIOD VT 00Z	1810Z		ICE CHARTS
0925Z	2	06Z SFC ANAL PART 1	CONTINUED ON SCHEDULE PART 2		
0938Z	3	06Z SFC ANAL PART 2			

NATIONAL WEATHER SERVICE/USCG BOSTON RADIOFAX SCHEDULE PART 2 - EFFECTIVE 28 NOV 00

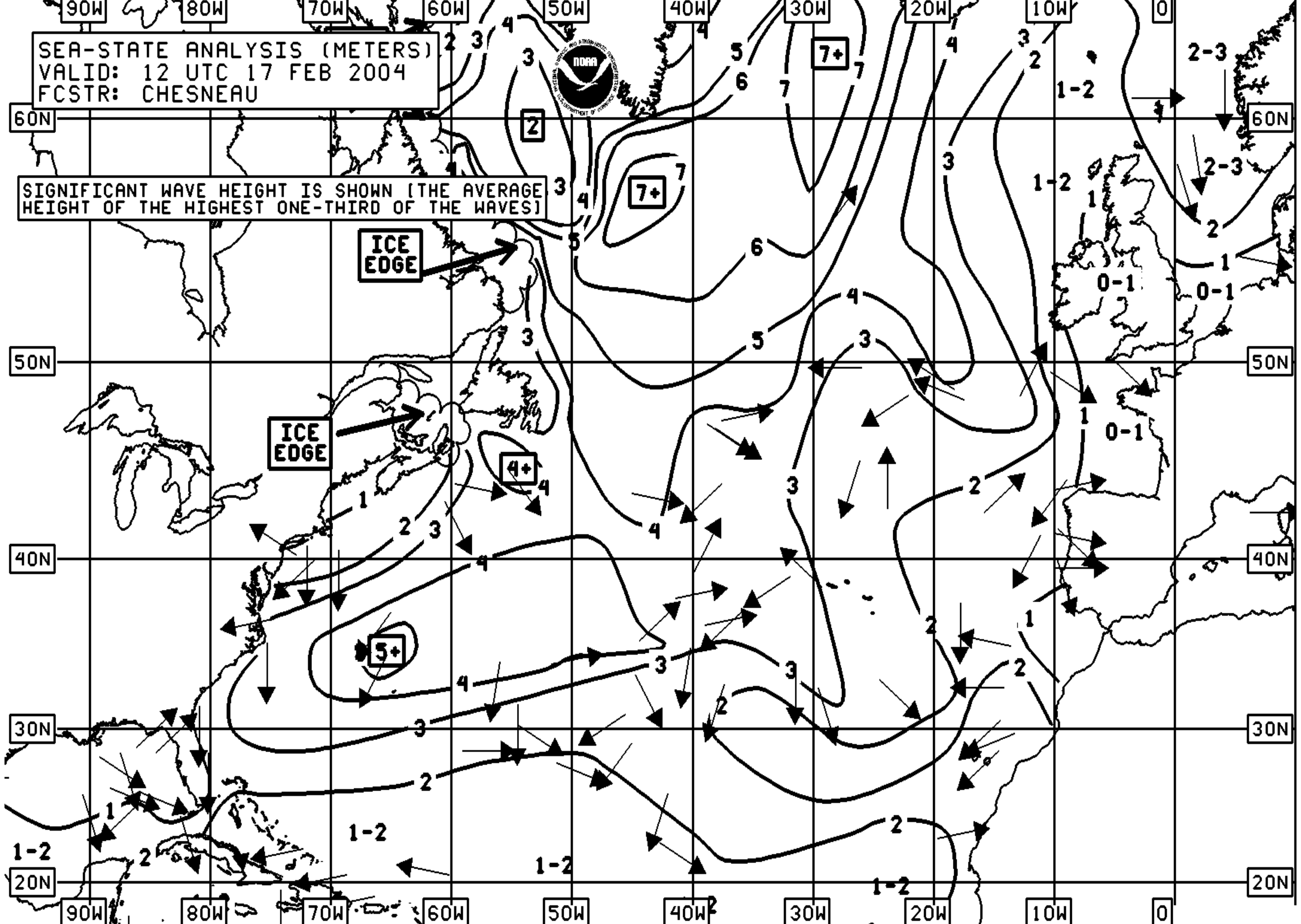
TIME	AREA	CHART	TIME	AREA	CHART
1900Z		TEST PATTERN	2045Z	4	96HR SFC VT 12Z
1905Z	1	24HR SFC VT 12Z	2055Z	4	96HR WIND/WV VT 12Z
1915Z	1	24HR WIND/WV VT 12Z	2105Z	4	96HR WV PERIOD VT 12Z
1925Z	1	24HR 500 MB VT 12Z	2115Z	4	RETRANSMIT 2045Z
1935Z	4	36HR 500 MB VT 00Z	2125Z	2	18Z SFC ANAL PART 1
1945Z	4	48HR 500 MB VT 12Z	2138Z	3	18Z SFC ANAL PART 2
1955Z	4	48HR SFC VT 12Z	2151Z	6	SATELLITE PICTURE
2005Z	4	48HR WIND/WV VT 12Z	2202Z	2	RETRANSMIT 2125Z
2015Z	4	48HR WV PERIOD VT 12Z	2215Z	3	RETRANSMIT 2138Z
2025Z	1	18Z PRELIM SFC ANAL	2228Z		END TRANSMISSION
2035Z	4	96HR 500 MB VT 12Z			

ASSIGNED FREQS: DAY = 6340.5/9110/12750 KHZ, NIGHT = 4235/6340.5/9110 KHZ
CARRIER FREQUENCY IS 1.9 KHZ BELOW ASSIGNED FREQUENCY

AREAS: 1=28N-52N, 45W-85W   2=15N-65N, 10E-45W
3=15N-65N, 40W-95W   4=15N-65N, 10E-95W
5=20N-55N, 55W-95W   6=00N-60N, 40W-130W

CONTRACTIONS: VT=VALID TIME, SFC=SURFACE, WV=WAVE, ATL=ATLANTIC
ANAL=ANALYSIS, PRELIM=PRELIMINARY

COMMENTS ON THIS SCHEDULE OR QUALITY OF CHARTS ARE INVITED.
WRITE TO: NATIONAL WEATHER SERVICE, WWBG ROOM 410,
5200 AUTH ROAD, WASHINGTON, D.C. 20233 ATTN: MPC
PHONE: 301-763-8441, PHONE FAX: 301-763-8085; EMAIL: David.Feit@noaa.gov



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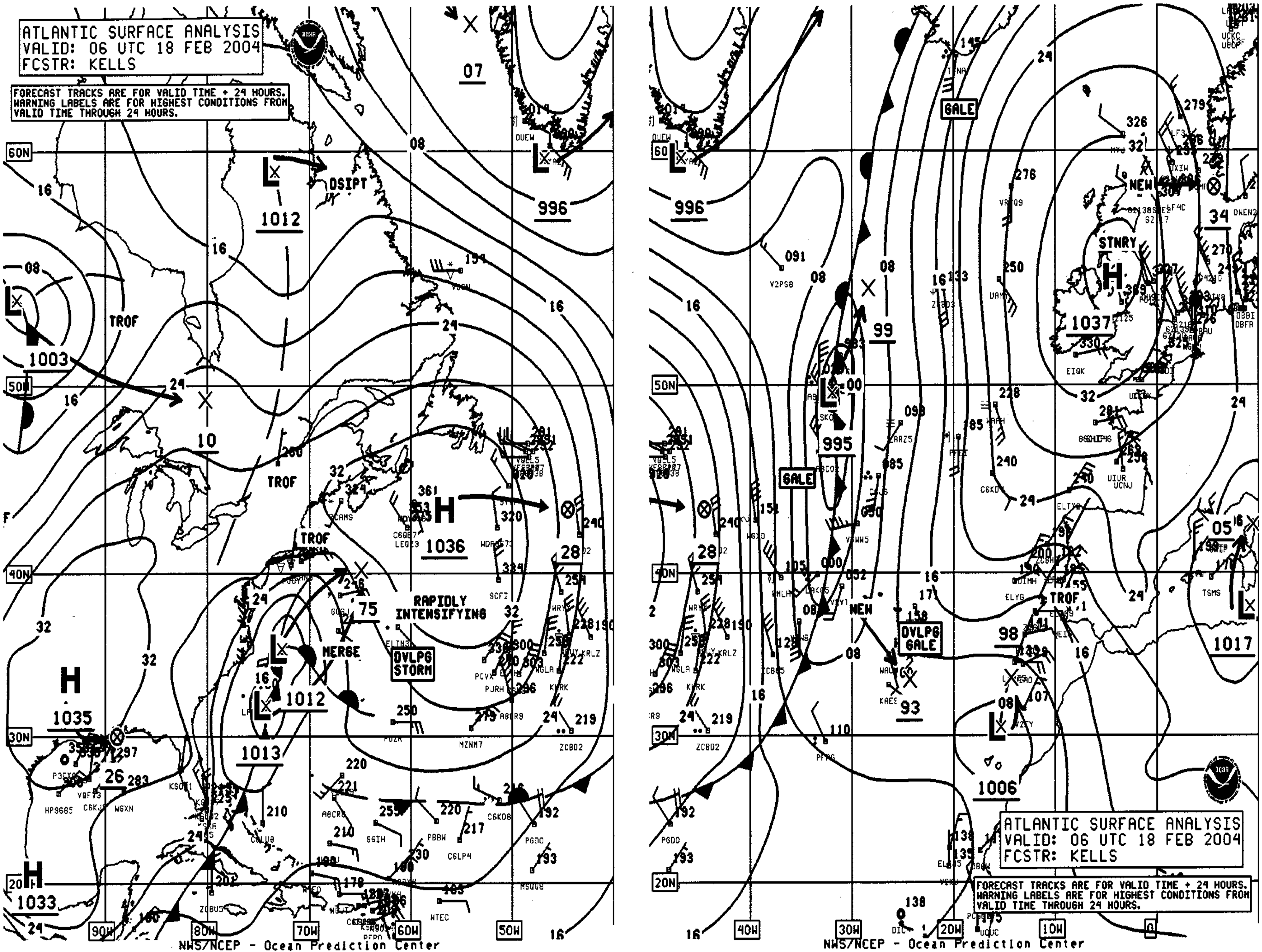
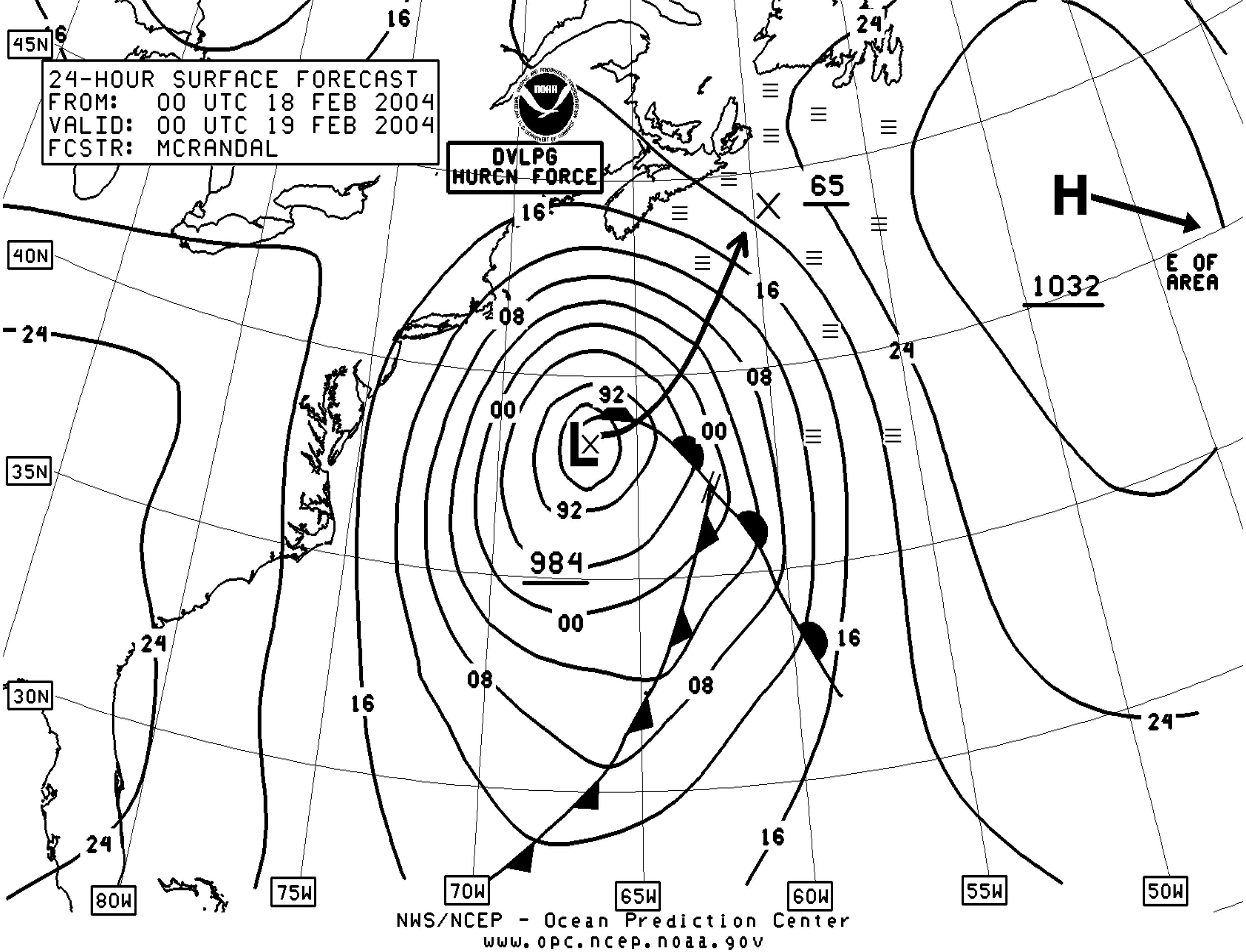


ATLANTIC SURFACE ANALYSIS
VALID: 06 UTC 18 FEB 2004
FCSTR: KELLS
FORECAST TRACKS ARE FOR VALID TIME + 24 HOURS.
WARNING LABELS ARE FOR HIGHEST CONDITIONS FROM VALID TIME THROUGH 24 HOURS.
DSIPT
TROF
RAPIDLY INTENSIFYING
MERGE
DVLPG STORM
GALE
DVLPG GALE
NEW
STNRY
1012
1003
1036
1035
1033
1013
996
995
1037
1017
1006
60N
50N
40N
30N
20N
90W
80W
70W
60W
50W
40W
30W
20W
10W
0
NWS/NCEP - Ocean Prediction Center


24-HOUR SURFACE FORECAST
FROM: 00 UTC 18 FEB 2004
VALID: 00 UTC 19 FEB 2004
FCSTR: MCRANDAL
DVLPG
HURCN FORCE
65
H
E OF
AREA
1032
984
L
45N
40N
35N
30N
80W
75W
70W
65W
60W
55W
50W
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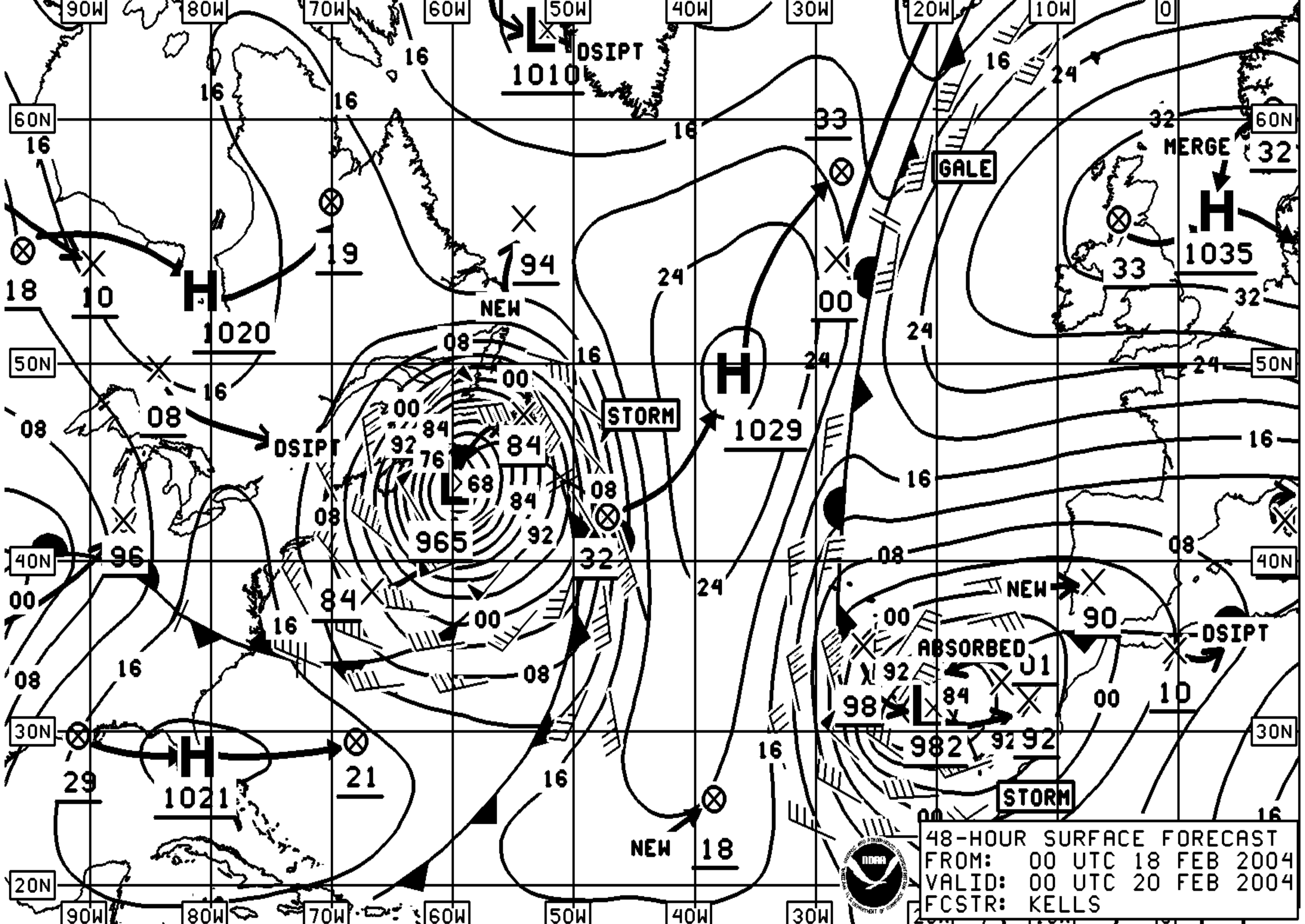

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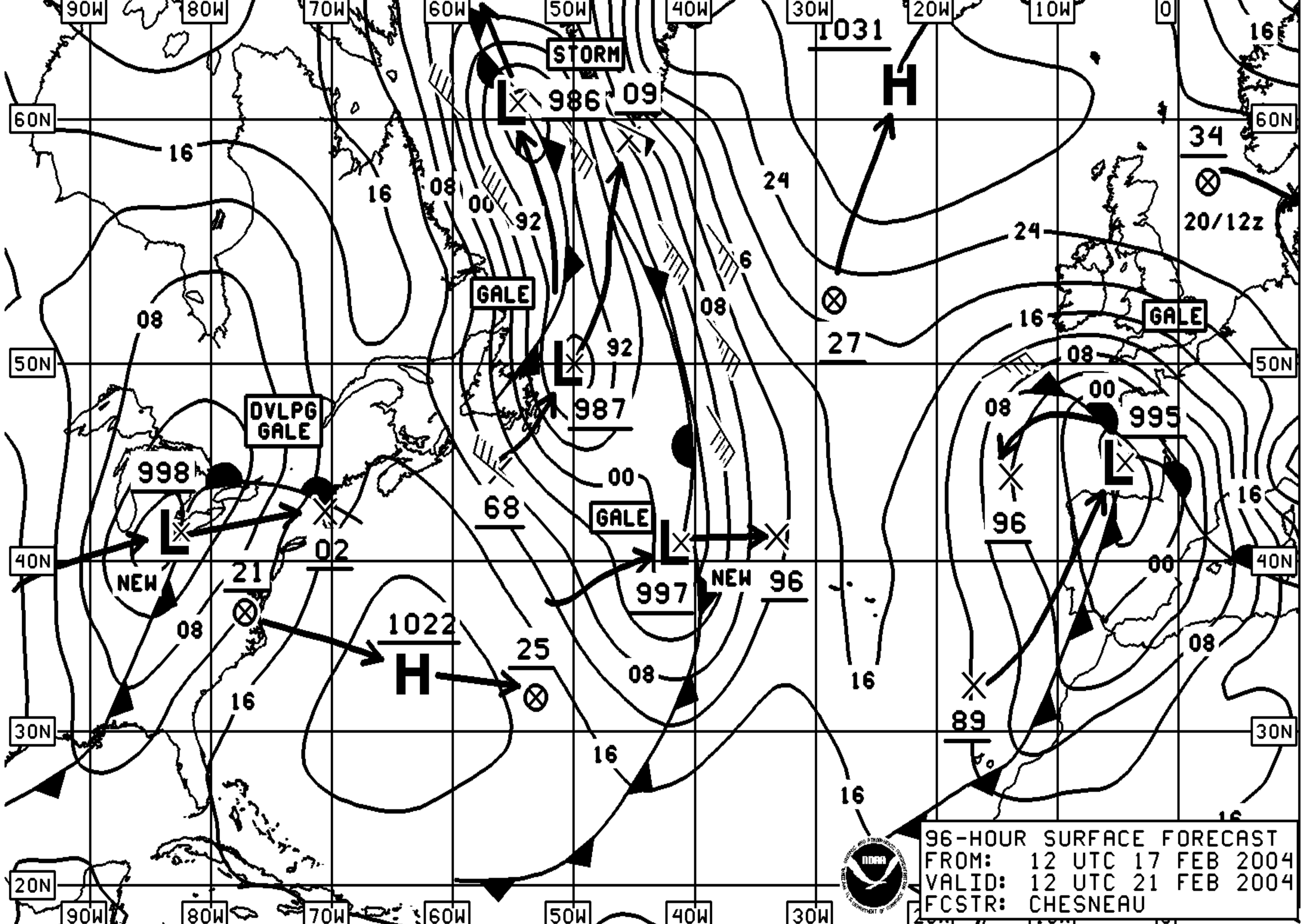

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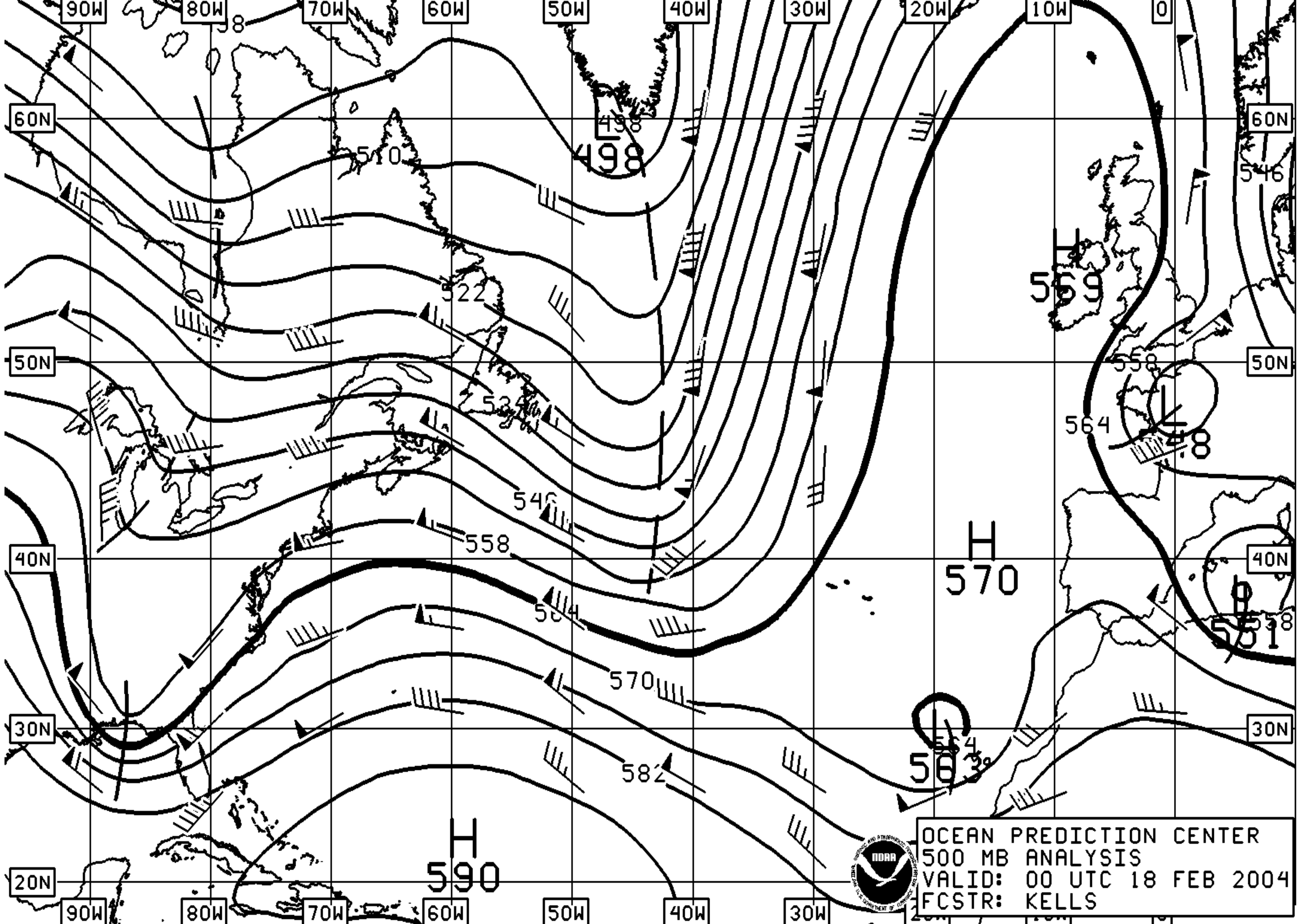

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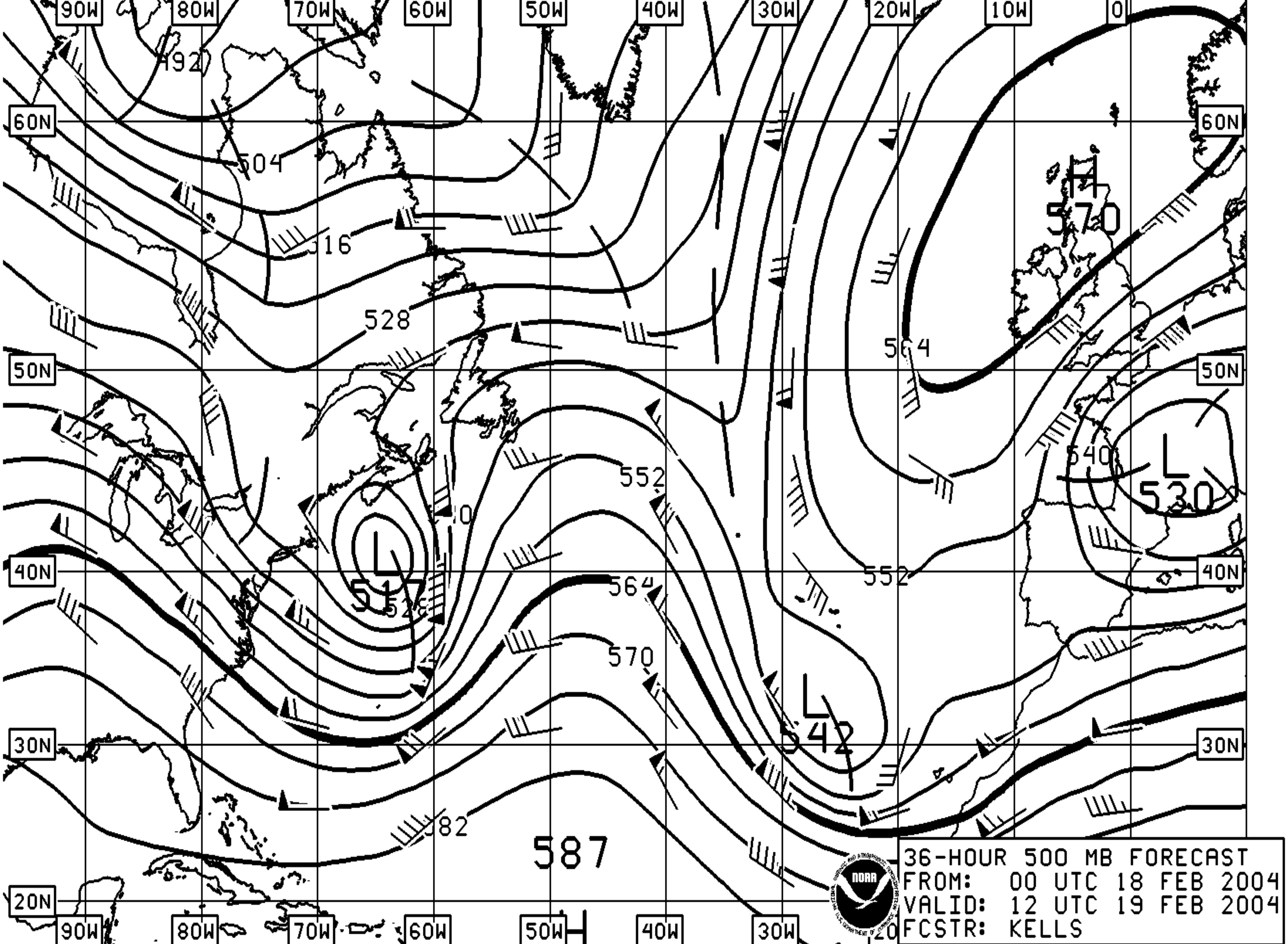

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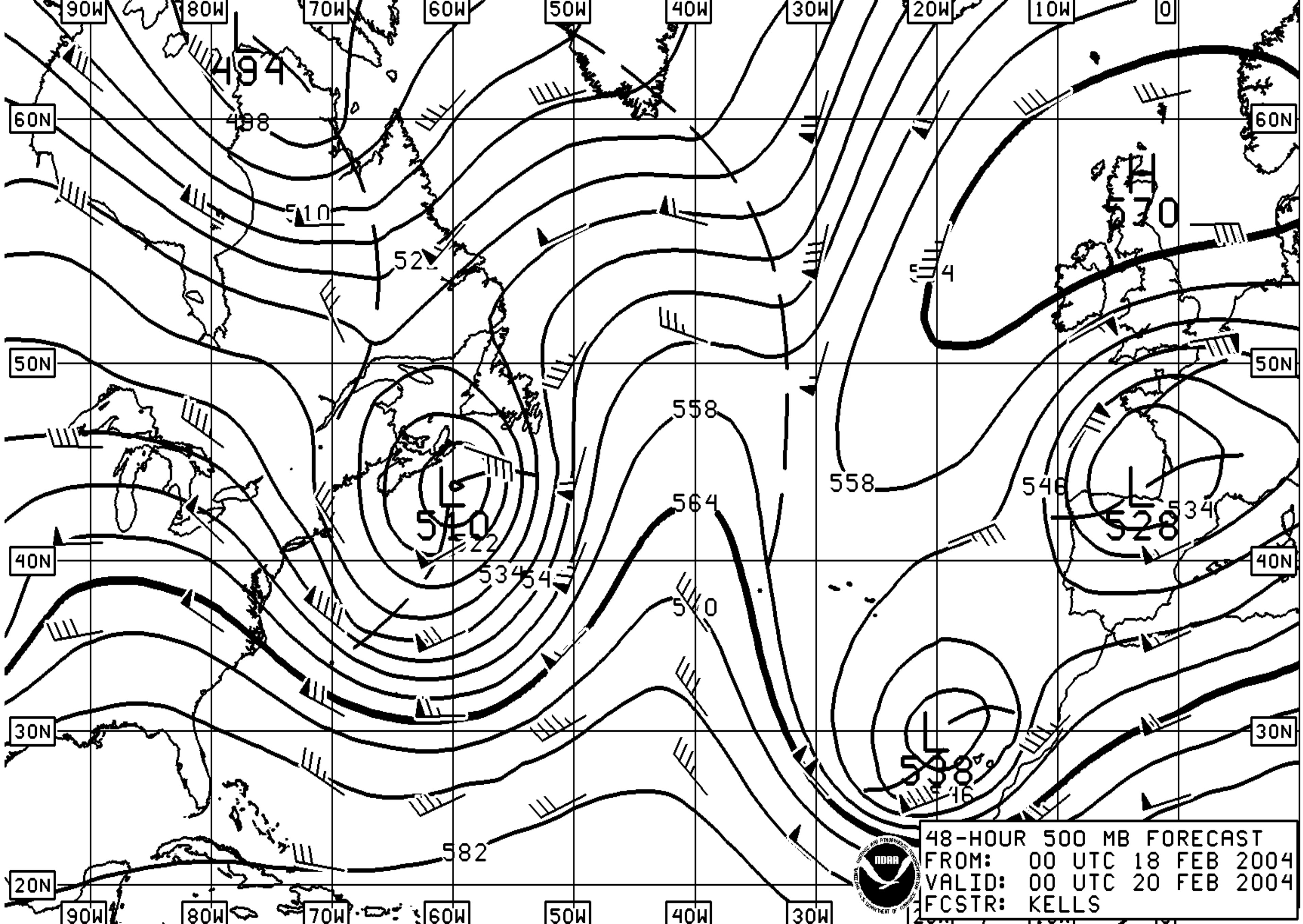

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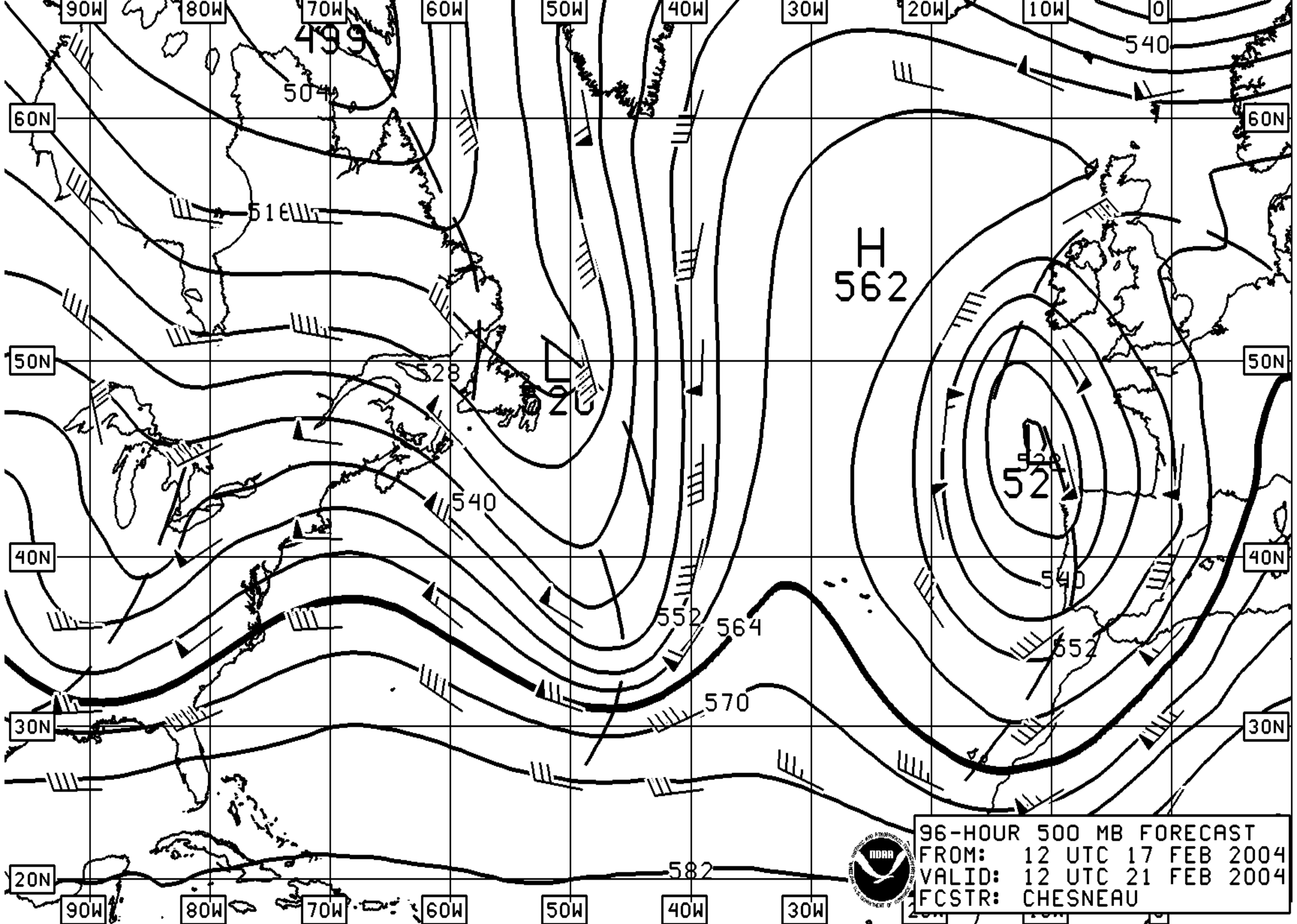

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Have a great Navy Day!
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Questions?